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# Fertility and Mortality in North Africa: Levels, Trends and Future Prospects

**Yousif, H.M.**

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## ABSTRACT

The focus of this paper is on substantive aspects of fertility and mortality, and their implications for future population trends in North Africa. There is convincing evidence that high fertility has been maintained for a considerable time and that a decline has begun in these countries. This decline is not uniformly the same in each country. Most of it is in urban areas, while fertility in rural areas is still high. Also, because of differences in desired fertility, use of contraceptive methods, and women's education, the potential for further decline in fertility varies considerably by place of residence. Results from the World Fertility Surveys and the Demographic and Health Surveys show enormous fertility differences by level of women's education. Also, they show large fertility declines in response to a few years increase in women's education. On the other hand, mortality decline is progressing rapidly. Life expectancy at birth has increased for males and females. There are substantial mortality differences between countries. Mortality data by place of residence in North Africa is not available except for Egypt, where life expectancy at birth has increased for rural males and females more than for their urban counterparts. These patterns of fertility and mortality will shape the future population trends for several years. In the first place, a young age structure resulting primarily from past high fertility levels will lead to high population growth momentum such that a decline in fertility will not have its full impact for quite a long period. The greatest demographic challenge for governments in North Africa is in rural areas, where fertility is the highest and women's education is the lowest. On the other hand, there are considerable uncertainties about future demographic trends in these countries primarily because of social development and political instability. With differences in development and varying political support to national population programs and activities, future population trends in these countries are likely to take a divergent course.

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# FERTILITY AND MORTALITY IN NORTH AFRICA: LEVELS, TRENDS AND FUTURE PROSPECTS

*Hassan Musa Yousif*

## INTRODUCTION

North Africa is characterized by high population growth as a result of high fertility and declining mortality. This generalization conceals substantial demographic heterogeneity between countries and within countries by place of residence (urban-rural) and level of education (primary, secondary, and tertiary). These countries are in various stages of development, modernization, and social change. Each country provides its own demographic laboratory. Government activities and the official stand on population policies are crucial in modulating demographic behavior and shaping the future pattern of fertility and mortality. Population policies and social programs influence reproductive decisions of couples in various ways. For example, the use of modern contraceptive methods is determined to a large extent by the government's stand on population issues. Government social policies and programs in many countries have successfully helped couples to achieve their fertility and health aspirations, primarily because these programs have gained social acceptance and direct government support. In other countries, couples failed to achieve some of these aspirations not because they are helpless victims of their own behavior, but because of lack of government and public support and of social obstacles. This paper provides basic understanding of the substantive aspects of fertility and mortality, and studies their implications for future population trends in countries in North Africa. The paper highlights demographic differentials by place of residence and education, and briefly reviews the stand of governments on population issues. It concludes with future demographic prospects.

Before exploring these issues, it is important to ask ourselves: What is the problem? The population in North Africa[1] is the third fastest growing in the world. The overall annual population growth rate is 2.5, exceeded by a rate of 2.6 for Western and Central Asia and 3.0 for Sub-Saharan Africa. This high growth rate is due to sustained high fertility for about two decades (1960s and 1970s) and declining mortality. High fertility produces a young age structure and strengthens the momentum of population growth. There is a large potential for future growth in the age structure of the population in North Africa. On the other hand, the potential for structural changes in these countries is great as a result of forces of modernization, internal social change, political instability, peace in the Middle East, and the rise of religious fundamentalism. Therefore, there is considerable uncertainty about future demographic trends.

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[1] The largest population is in Egypt. Over a ten-year period (1976-1986), the population of Egypt increased by about 11.6 million persons (from 36.6 million in 1976 to 48.2 million in 1986). The population in Egypt is estimated at around 52 million in 1995. Sudan ranks second, with a population estimated at about 29 million in 1995. In the Maghreb countries, Algeria and Morocco have the largest populations. The population of Algeria increased from 16.3 million in 1977 to 22.6 million in 1987, and is estimated around 28.7 million in 1995. The population of Morocco was 15.2 million in 1971. It increased to 20.5 million in 1982 and is expected to be about 28 million in 1995. By contrast, Libya and Tunisia have small populations. The population of Libya increased from 2.2 million in 1973 to 3.2 million in 1984, and is expected to be 5.5 million in 1995. The population of Tunisia, the most slowly-growing in the region, increased from 4.5 million in 1966 to 6.9 million in 1984, and is expected to be about 9 million in 1995.

## SOURCES OF DATA

Registration of vital events, regular periodic censuses, and national sample surveys are the most well-known sources of data for demographic analysis. The system of vital registration is deficient and the quality of vital statistics is generally poor in most countries of Northern Africa. Censuses and national surveys are, therefore, the best available sources of demographic data. Censuses usually provide very limited information on deaths and on children ever born (CEB). Table 1 provides dates of censuses and national sample surveys conducted in the countries of Northern Africa. The earliest censuses were conducted in the 19th century in Egypt. Egypt's first official count of its population was in 1882; the second was in 1897. The most recent censuses were taken in roughly ten-year intervals. Egypt, Morocco, Sudan, and Tunisia participated in the international rounds of World Fertility Surveys (WFS) and the Demographic and Health Surveys (DHS). Algeria conducted its first national fertility survey in 1987.

Table 1. Censuses and national sample surveys. Source: UNECA 1992, Table 29.

| Country | Censuses | National Surveys |
|---|---|---|
| Algeria | 1966,1977,1987 | National Fertility Survey 1987 |
| Egypt | 1800, 1882, 1887, 1907, 1917, 1927, 1937, 1960, 1966, 1976, 1986 | Egypt Fertility Survey 1979-1980.<br>Demographic & Health Surveys 1986-88, 1990-92<br>Use Effectiveness of Contraceptives 1993<br>Maternal and Child Health Survey 1991 |
| Libya | 1931, 1936, 1954, 1964, 1973, 1984 | No surveys |
| Morocco | 1960,1971,1982,1992 | Morocco Fertility Surveys 1979-1980<br>Morocco Demographic and Health Survey 1987<br>National Survey on Population and Health (ENPS-II) 1992 |
| Sudan | 1955/56, 1973, 1983, 1993 | Sudan Fertility Survey 1979<br>Sudan Demographic and Health Survey 1989-1990 |
| Tunisia | 1921, 1926, 1931, 1936, 1946, 1956, 1966, 1975, 1984, 1994 | Tunisia National Fertility Survey 1979<br>Tunisia Demographic and Health Survey 1988 |

In this paper we use official data provided by the statistical offices to the United Nations Population Division. These usually are published in the United Nations *Demographic Yearbooks.* Data for these yearbooks were compiled by a set of questionnaires sent annually to the statistical offices, supplemented by data from official censuses, civil registration, and national sample surveys. One problem we encountered with the UN *Demographic Yearbooks* is that mortality measures, particularly life expectancy at birth and infant mortality rates, are surprisingly the same for Libya and Morocco for the period 1950-1990.[2] A general data problem is that because of the proximity of rural areas to urban centers, high population mobility, and growing urbanization in North Africa, death statistics are likely

[2] The author of this paper contacted the UN Population Division on this issue. The error is attributed to lack of data. The Population Division agreed to correct this error in its forthcoming *Demographic Yearbooks.*

to be sensitive to errors relating to the place of residence. For example, women living in rural areas near major cities may travel to hospitals and maternity centers for delivery. Therefore, infant and maternal mortality differentials by place of residence are likely to be distorted somewhat if the death events are classified by place of occurrence rather than by place of usual residence.

## FERTILITY

### Fertility from 1960-1979

During 1960s and 1970s, all countries in North Africa, except Egypt and Tunisia, were characterized by high fertility. Total fertility rates (TFR) were high, usually 6 to 7 or more live births per woman in each country (Table 2 and Figure 1). The TFR in Egypt and Tunisia were 7.1 and 7.2, respectively, during the 1960s, and 5.6 and 5.7, respectively, during the 1970s. In Algeria, TFR was 7.5 in 1966 and 7.2 in 1977. For Morocco, TFR was 7.1 in 1960 and 6.9 in 1971. One possible explanation for the high total fertility rates is early marriage. The mean age of entry into marriage was low. Early marriage provided the social and cultural environment for sustained high fertility (Coale 1993). Also, because of cultural factors, such as predominance of the patriarchal family and extended family norms, women were traditionally very subordinate; a daughter went from parental (family) domination to domination by her husband's family. During the 1960s and 1970s there was a strong anti-family-planning stand in all countries in North Africa, therefore, family planning activities were very limited.

Table 2. Total fertility rates. Sources: UN 1993; Khalifa 1994; Department of Statistics 1991.

| Country | 1960-69 | 1970-79 | 1980-92 | Change in years 1970-79 to 1980-92 |
|---|---|---|---|---|
| Algeria | 7.5 (1966) | 7.2 (1977) | 4.4 (1992) | 2.8 (38%) |
| Egypt | 7.1 (1960) | 5.6 (1976) | 3.9 (1992) | 1.7 (30%) |
| Libya | 7.2 (1964) | 7.7 (1973) | 7.2 (1984) | 0.5 (6%) |
| Morocco | 7.1 (1960) | 6.9 (1971) | 4.0 (1992) | 2.9 (42%) |
| Sudan | 6.7 (1960) | 6.9 (1979) | 4.9 (1990) | 2.0 (29%) |
| Tunisia | 7.2 (1966) | 5.7 (1975) | 3.4 (1988) | 2.3 (40%) |

Another possible explanation for sustained high fertility is improving standards of living and income levels. Income affects fertility in a number of indirect ways. It is more likely that a woman does not work outside the house if her husband's income is rising. Income would, therefore, increase the likelihood of the wife staying at home, and possibly increase the motivation to have more children. Also, rising incomes often lead to improvement in nutrition and health, thus contributing to lower infant and child mortality, which in turn affects fertility. Rising incomes are also associated with bottle feeding, eventually leading to a decrease in breast feeding, with possible substantial positive effects on fertility. When the need for dowry, cost of marriage, and setting up a new household are obstacles that tend to delay marriage, rising incomes may permit earlier marriage and earlier childbearing.

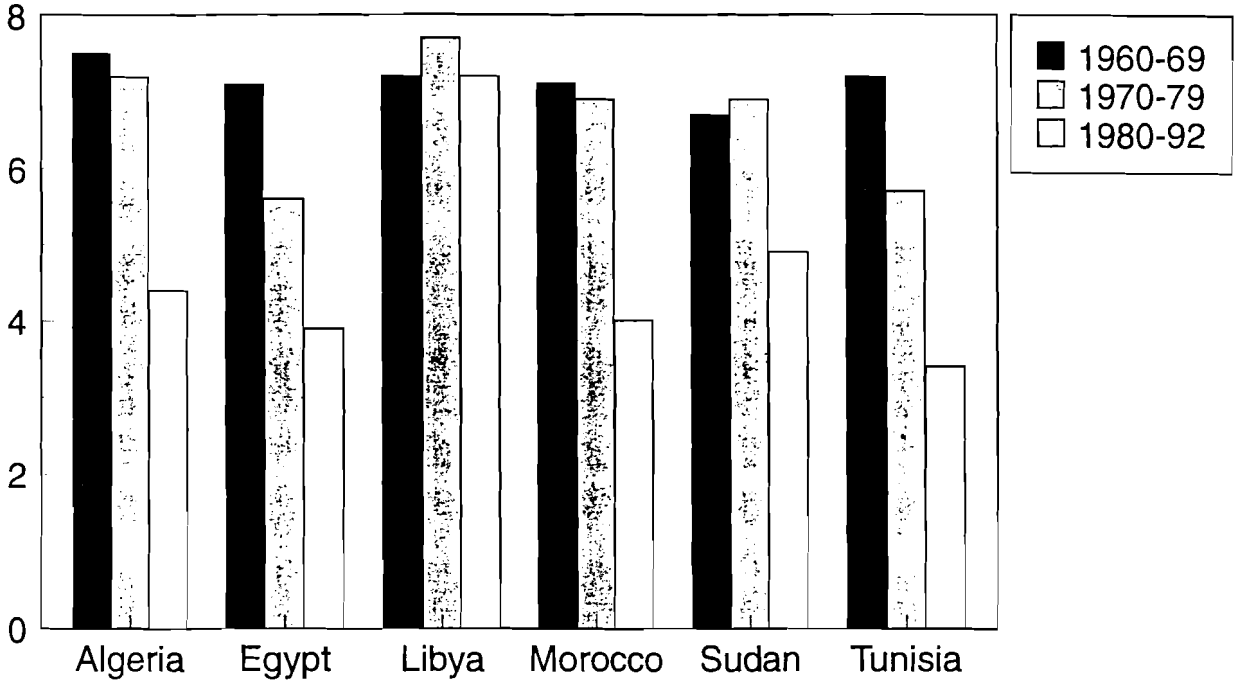


Figure 1. Trends in total fertility rates. Sources: UN 1993; Khalifa 1994; Department of Statistics 1991.

## Fertility Decline

There is convincing evidence that a decline in fertility is underway in North Africa. The level of fertility during the late 1980s and early 1990s is different from what it was during the 1960s and 1970s (Table 2 and Figure 1). The largest drop is in the Maghreb countries. The total fertility rate declined by about 38% (2.8 children) in Algeria (1977-1992), 42% (2.9 children) in Morocco (1971-1992), and 40% (2.9 children) in Tunisia (1975-1989). In Egypt, the total fertility rate, which was 5.6 in 1976, declined to 4.1 in 1991 and 3.9 in 1992--a drop of about 30% in 17 years. High fertility levels during the 1960s and 1970s in Sudan slowly declined in recent years. Results from the Sudan WFS and DHS show that fertility has declined by about 29%, from 6.9 in 1979 to 4.9 in 1990 (Department of Statistics 1991).

Age-specific fertility rates show a declining trend. There is a downward shift in the age-specific fertility curves for all countries (Table 3 and Figure 2). The largest shift is in the peak childbearing period 25-34. Factors, such as increasing use of contraceptives, women's education, rising age at marriage, and social change, operate together to bring down fertility even though traditional and religious factors may impede this process. Also, government support of population policies and programs is gaining momentum. It is not a coincidence that the rapid decline of fertility in Egypt and Tunisia took place at a time when government intervention to resolve population issues was on the rise. In these two countries, the use of family planning methods has increased significantly during the last 15 years. More important is the substantial increase in women's education. High illiteracy rates in the 1960s and 1970s have sharply declined in the last decade. For example, illiteracy rates that were above 85% for women in Tunisia, Algeria, and Morocco during the 1960s have declined to less than 50% during the 1980s. Women's education in Egypt, Sudan, and Libya has increased too. However, because of differential

access to education services by place of residence, urban women are likely to be more educated than rural women. Also, high urbanization in countries in North Africa have contributed to lower fertility.

Table 3. Age-specific fertility rates per 1000 women. Sources: UN 1987, 1993; National Board of Statistics 1991.

| Country/Year | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | TFR |
|---|---|---|---|---|---|---|---|---|
| Algeria | | | | | | | | |
| 1984 | 47 | 239 | 322 | 293 | 227 | 104 | 20 | 6.3 |
| 1986 | 35 | 212 | 263 | 273 | 212 | 86 | 17 | 5.5 |
| 1988 | 33 | 175 | 260 | 250 | 202 | 104 | 18 | 5.2 |
| 1995* | 30 | 155 | 233 | 172 | 120 | 52 | 8 | 3.9 |
| Egypt | | | | | | | | |
| 1980 (WFS) | 99 | 256 | 286 | 217 | 130 | 48 | 16 | 5.3 |
| 1988 (DHS) | 72 | 220 | 243 | 182 | 118 | 41 | 6 | 4.4 |
| 1991 (EMCHS) | 69 | 215 | 216 | 192 | 93 | 40 | 6 | 4.2 |
| 1992 (DHS) | 63 | 208 | 222 | 155 | 89 | 43 | 6 | 3.9 |
| 1995* | 73 | 205 | 222 | 151 | 86 | 31 | 9 | 3.9 |
| Libya | | | | | | | | |
| 1973 (UN) | 249 | 407 | 360 | 285 | 151 | 66 | 29 | 7.7 |
| 1995* | 110 | 279 | 313 | 272 | 190 | 95 | 20 | 6.4 |
| Morocco | | | | | | | | |
| 1981 (WFS) | 93 | 265 | 296 | 222 | 178 | 98 | 29 | 5.9 |
| 1992 (ENPS-II) | 40 | 139 | 183 | 182 | 138 | 86 | 39 | 4.0 |
| 1995* | 37 | 138 | 211 | 167 | 114 | 59 | 24 | 3.8 |
| Sudan | | | | | | | | |
| 1979 (WFS) | 114 | 264 | 283 | 251 | 149 | 108 | 35 | 6.0 |
| 1983 (Census) | 115 | 294 | 348 | 268 | 196 | 79 | 74 | 6.9 |
| 1990 (DHS) | 69 | 183 | 240 | 236 | 157 | 82 | 25 | 4.9 |
| 1995* | 88 | 234 | 290 | 259 | 167 | 84 | 25 | 5.7 |
| Tunisia | | | | | | | | |
| 1978 (WFS) | 34 | 225 | 304 | 260 | 199 | 112 | 36 | 5.9 |
| 1984 (UN) | 35 | 173 | 248 | 238 | 140 | 54 | 18 | 4.5 |
| 1988 (DHS) | 17 | 131 | 195 | 176 | 113 | 41 | 9 | 3.4 |
| 1995* | 23 | 128 | 209 | 152 | 82 | 31 | 6 | 3.2 |

* UN Population Division estimates for 1990-95 (The 1994 Revision) median variant projections.

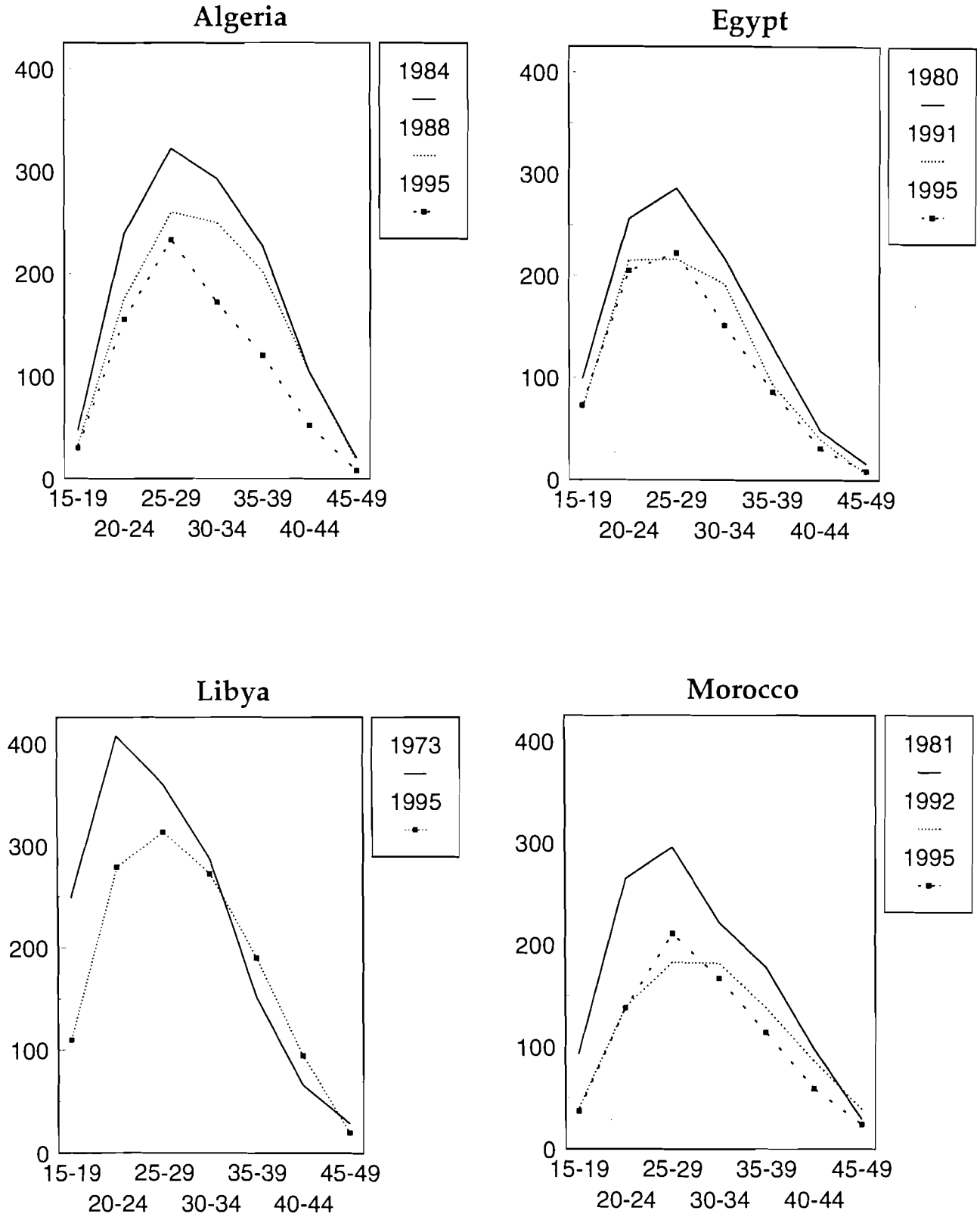


Figure 2. Age-specific fertility rates.

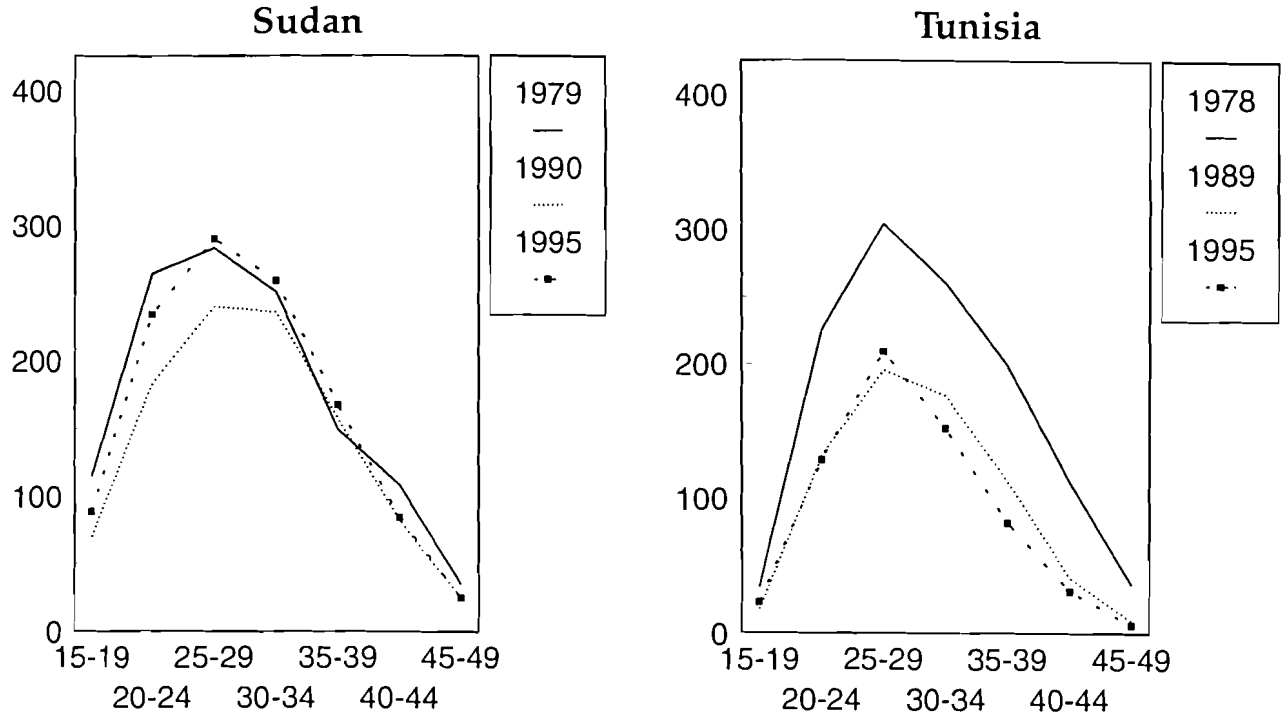


Figure 2 (continued). Age-specific fertility rates.

## Fertility by Place of Residence

Place of residence (rural/urban) has a pervasive influence on fertility. It summarizes many differences in opportunities available to households. Urban households have better access to social services, particularly education and health services, and modern employment opportunities. Moreover, households in urban areas are more likely to possess modern types of consumer goods. These may alter reproductive behavior and ease the diffusion of contraceptive technology. Urban fertility is likely to be lower than rural fertility.

Research shows that rural women have higher fertility than urban women in North Africa. According to the WFS, rural women in four countries in North Africa bear, on average, 2.5 children more than urban women. The fertility difference between rural and major urban areas[3] (Table 4 and Figure 3) is 2.3 children for Egypt, 3.1 children for Morocco, 1.6 children for Sudan, and 2.2 children for Tunisia (UN 1987). Recent findings from DHS surveys reveal similar differences. For example, the Sudan Demographic and Health Survey shows lower fertility in urban (TFR = 4.1) than rural (TFR = 5.6) areas, and lower fertility in Khartoum (TFR = 3.7) than in other regions of the country. Results from the 1991 Egypt Maternal and Child Health Survey give a TFR of 2.7 for the urban governorate,[4] 3.2

[3] In the WFS surveys, the place of current residence was coded in three categories: rural, other urban and major urban. The basic definition of rural versus urban was left to the discretion of the individual countries. Countries use various criteria based on population size, sewerage, electricity, water, etc., to differentiate between rural and urban areas. Further division of urban areas into "other urban" and "major urban" was based on a set of rules, such as (1) cities exceeding 1 million were classified as major urban, and (2) national capitals, regardless of population size, were classified as major urban (UN 1987, p. 190).

[4] In Egypt, the governorates of Cairo, Alexandria, Port Said, Ismailia, Suez, frontier governorates and capitals of other governorates, as well as district capitals (Markaz), are considered urban.

for urban lower Egypt, and 3.6 for urban upper Egypt, in contrast to 4.4 for rural lower Egypt and 6.3 for rural upper Egypt. Rural-urban fertility difference in upper Egypt is considerable (Zohry 1994).

Table 4. Fertility and family planning measures by place of residence (WFS). Source: UN 1987, Tables 96, 99, 104.

| Fertility/ Place of residence | Egypt | Morocco | Sudan | Tunisia |
|---|---|---|---|---|
| Total Fertility Rates | | | | |
| Major Urban | 3.8 | 3.9 | 4.8 | |
| Other Urban | 4.9 | 4.8 | 5.7 | 4.8** |
| Rural | 6.1 | 7.0 | 6.4 | 7.0 |
| Desired Family Size* | | | | |
| Major Urban | 3.0 | 3.9 | 5.5 | 3.4 |
| Other Urban | 3.5 | 4.2 | 6.1 | 3.9 |
| Rural | 4.8 | 5.5 | 6.5 | 4.6 |
| Contraceptives Use | | | | |
| Major Urban | 42.0 | 40.0 | 16.0 | |
| Other Urban | 36.0 | 35.0 | 9.0 | 43.0** |
| Rural | 13.0 | 10.0 | 2.0 | 21.0 |

* Mean desired family size for ever-married women, 15-49 years old, adjusted for the effects of age difference between residence groups.

** These numbers for Tunisia are for major urban and other urban together.

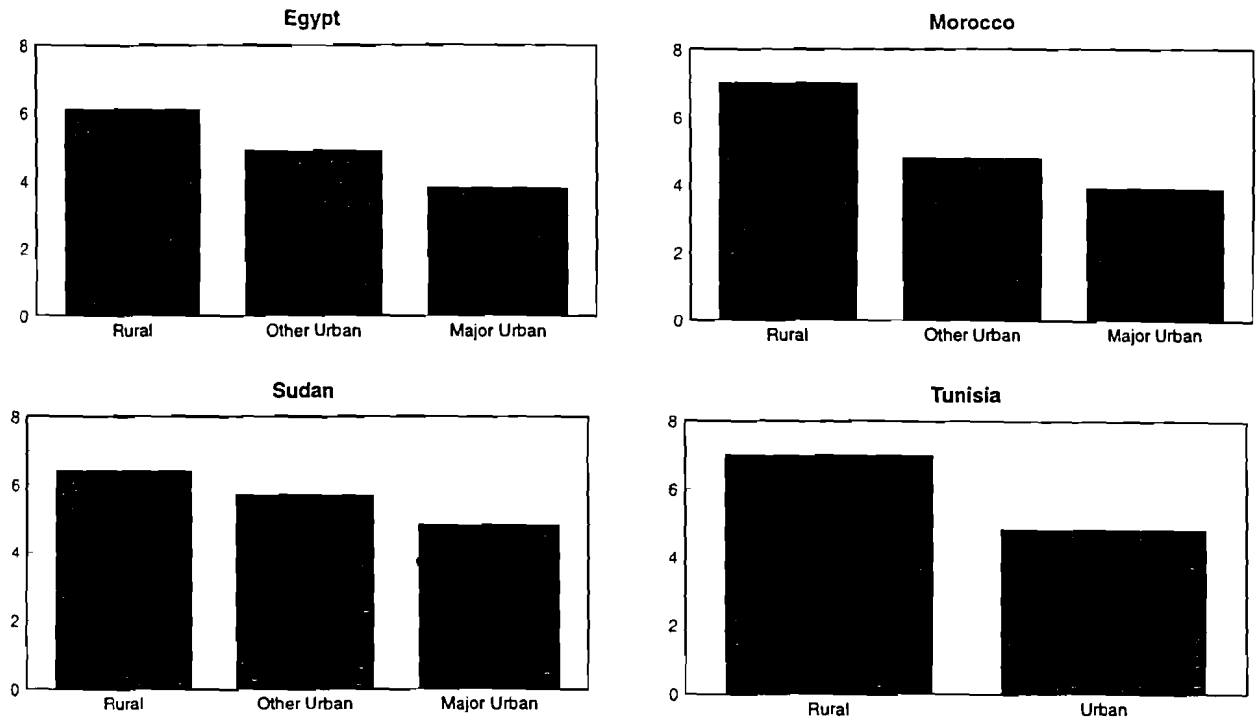


Figure 3. Total fertility rate by place of residence.

Differing compositional factors, such as education and access to and use of family planning methods, may explain some of the rural-urban fertility differences. Rural women are far less educated than urban women. In Sudan, for example, the DHS shows that 55% of the rural women have never attended school as compared with 33% of the urban women. Also, rural women have limited access to and low use of contraceptive methods in contrast to urban women, who have better access to family planning services. According to the WFS, the difference (in percentage points) between rural and urban use of contraceptive methods[5] is 29 for Egypt, 30 for Morocco, 14 for Sudan and 22 for Tunisia. More recent results from the 1992 Egypt Demographic and Health Survey show the percentage of current users of modern contraceptive methods among currently married women to be 55.6% for the urban governorate, 58.5% and 54.4% in urban lower and upper Egypt, respectively, and 48.2% and 23.0% in rural lower and upper Egypt respectively (Khalifa 1994, p. 7). This same measure for Sudan is 11.3% in urban areas, and 2.2% in rural areas (Department of Statistics 1991). Modern contraceptive methods are more likely to have a greater role in lowering fertility in urban than in rural areas.

The social and cultural environment in rural areas is more conducive to high fertility than in urban areas. This is reflected in the persistence of traditional beliefs and values and the cultural support to women's reproductive role. Rural women marry at an earlier age than urban women. According to the WFS, the difference in the singulate mean age at marriage (SMAM) between rural and urban women is 3.2 years for Egypt, 2.9 years for Morocco, 1.9 years for Sudan, and 1.4 years for Tunisia. More recent findings from the DHS indicate that the median age at first marriage is on the rise, and that the rural-urban difference is widening. For women aged 25-29, the DHS results for the Sudan, for example, give a median age at first marriage of 23.2 years for urban women and 19.0 years for rural women--4.2 years difference. With education spreading in urban areas more rapidly than in the rural areas, this result is not unexpected. It is, therefore, expected that fertility desires in rural areas are higher than in urban areas. The WFS results show that, on average, rural women in Egypt, Morocco and Tunisia desire 4.8, 5.5 and 4.6 children, respectively, in contrast to 3.0, 3.9 and 3.4 children in major urban areas in the same countries (Table 4). The DHS for Sudan show that rural women desire 6.3 children, compared to 5.3 for urban women (Department of Statistics 1991).

## Fertility and Women's Education

Education leads to higher social status for women and facilitates changes in fertility (UN 1987; Casterline et al. 1984; Cochrane 1979). Empirical evidence continues to accumulate in support of a strong negative relationship between women's education and fertility. Women's education acts on fertility through a set of mechanisms and variables, such as:

- School attendance for several years increases age at marriage and raises aspirations regarding a marriage partner.
- Women's education changes traditional values, attitudes and norms, and strengthens women's social status within households and in communities.
- Education facilitates women's employment in modern activities outside the home, therefore, women's family desires and health aspirations are likely to change.
- Educated women are more likely to use modern contraceptive methods.

Different cohorts have differential access to educational services. Younger generations in many countries are presently better educated than older generations, therefore, they may experience greater fertility decline. Countries differ from one to another with regard to the level of education (or years

[5] This refers to the percentage of currently married women aged 15-49 who were currently using contraception by current residence, adjusting for the effects of age difference between residence groups (UN 1987).

of schooling) at which fertility starts to decline (Timur 1977). Access to educational services differs by residence. In addition, a particular level of education may affect fertility in urban and rural areas differently.

However, education could result in an increase in fertility. Empirical studies have shown that negative effects of women's education may not appear at the lowest levels of education (Cochrane 1979). Some primary education may increase rather than decrease fertility. Highest fertility often is found not among women without education, but among those with a few years of schooling. The positive effect of a low level of education is especially marked in rural areas and in less urbanized and poorer developing countries where income is low. One possible mechanism is that a few years of education, under backward conditions, may lead to a decline in breast feeding or improvement in health, which is not offset by such effects as marriage delay. In a pre-demographic transition stage, women's education may not instigate a movement towards lower fertility (Caldwell 1983). According to Caldwell, schooling of many children is economically rewarding for parents, therefore, fertility remains high.

The literature for North Africa documents varying experiences on education-fertility interrelations. In the early 1970s in Morocco, fertility was almost the same for all levels of education (Timur 1977). Studies done for Egypt, Algeria, Sudan and Tunisia during the 1960s and early 1970s document a different pattern: large fertility declines in response to a few years increase in women's education. In Egypt during the 1960s, women 30 years or older, who completed primary education, had 1.3 children less than women in the same age group with no education (Timur 1977). For Algerian women who had completed their fertile period, those with primary education had reduced their fertility by approximately 2 children fewer than women with no education. A survey of fertility and family planning done in Sudan in 1975 by Caldwell (as part of the Changing African Family Project) unravelled, for the first time, fertility differences by level of education in urban Sudan. Age standardized mean children ever born showed a small difference between women with no education and women with a few years of education. Women with secondary education had two children less than women with no education (Richard et al. 1982).

Data from the WFS and DHS provide comprehensive and convincing evidence in support of education-fertility interrelationships. On average over all WFS countries, seven or more years of schooling reduce fertility by about three children, while a few years of schooling lead to a slightly higher fertility, in contrast to women with no education (UN 1987). Results from the WFS for Egypt, Morocco, Sudan, and Tunisia show large fertility differences by level of education (Table 5). Women with no schooling have substantially higher fertility than women with seven or more years of education. The difference between these two levels of education amounts to 2 and 3 or more children when we consider CEB (children ever born), TFR and TMFR (total marital fertility rate). It is important to note that CEB is a cohort measure based on ever married women aged 40-49 for Egypt and Tunisia, and on all ever married women for Sudan and Morocco. TMFR and TFR are age standardized period measures.

Mirroring the lower fertility rates, one sees that education influences family desires and use of contraceptive methods. With an increasing level of education desired, fertility decreases and the percentage use of contraceptive methods increases (Table 5). Desired family size (DFS), defined as the mean desired family size for ever married women aged 15-49, is adjusted for the effects of age difference between education groups. The use of contraceptive methods, which is measured as the percentage of currently married women aged 15-49 currently using contraception, is adjusted for the effects of age differences between education groups (UN 1987).

Table 5. Fertility and family planning measures by years of education and place of residence (WFS results). CEB = children ever born. TMFR = total marital fertility rate. TFR = total fertility rate. DFS = desired family size. CU = contraceptives use. Source: UN 1987, Tables 112, 115, 122.

| Country/ Fertility Measure | Years of Education | | | | |
|---|---|---|---|---|---|
| | 0 | 1-3 | 4-6 | 7+ | Difference (0-7+) |
| Egypt | | | | | |
| CEB | 6.8 | 7.2 | 6.5 | 3.7 | 3.1 (45.6%) |
| TMFR | 6.5 | 6.4 | 6.2 | 3.8 | 2.7 (41.5%) |
| DFS | 4.5 | 3.9 | 3.5 | 2.6 | 1.9 (42.2%) |
| CU | 17.0 | 25.0 | 32.0 | 53.0 | 36.0 |
| Morocco | | | | | |
| CEB | 7.1 | 7.3 | 6.3 | ... | ... |
| TMFR | 7.0 | 5.5 | 5.8 | 4.6 | 2.4 (34.3%) |
| TFR | 6.4 | 5.2 | 4.4 | 4.2 | 2.2 (34.4%) |
| DFS | 5.1 | 4.0 | 3.9 | 3.4 | 1.7 (33.3%) |
| CU | 16.0 | 37.0 | 53.0 | 56.0 | 40.0 |
| Sudan | | | | | |
| CEB | 6.1 | 6.9 | 5.8 | 3.9 | 2.2 (36.1%) |
| TMFR | 6.7 | 7.4 | 6.9 | 5.1 | 1.6 (23.9%) |
| TFR | 6.5 | 5.6 | 5.0 | 3.1 | 3.4 (52.3%) |
| DFS | 6.5 | 6.1 | 5.4 | 5.0 | 1.5 (23.1%) |
| CU | 2.0 | 11.0 | 12.0 | 35.0 | 33.0 |
| Tunisia | | | | | |
| CEB | 6.8 | 5.9 | 6.4 | 3.6 | 3.2 (47.1%) |
| TMFR | 7.3 | 5.9 | 6.0 | 3.9 | 3.4 (46.6%) |
| DFS | 4.3 | 4.0 | 3.6 | 3.2 | 1.1 (25.6%) |
| CU | 25.0 | 46.0 | 50.0 | 62.0 | 37.0 |

The Maternal and Child Health Survey (MCHS) conducted in Egypt in 1991 provides more insights on education-fertility interactions. Controlling for age at first marriage, women with no education have systematically higher fertility than women with secondary or higher levels of education (Hosam Eldin 1994). Also, the same differential pattern prevails when we control for use of contraceptive methods. Among ever users of family planning methods, women with no education have on average 5.7 children ever born, compared to 4.2 for women with primary education and 3.0 for women with secondary or higher levels of education. The Sudan Demographic and Health Survey (SDHS) documents a similar large differential pattern by level of education. Women who had secondary education have on average 3.3 children, compared to 5.9 children for women with no schooling (Department of Statistics 1991).

Family planning and women's education are both weak in Sudan compared to remaining countries in North Africa. Also, in contrast to other countries in North Africa, desired fertility in Sudan is large. The WFS results show that women with no education have the highest desired fertility (Table 5). With seven or more years of schooling desired fertility declines by 1.5 children. Recent results from the Sudan Demographic and Health Survey show high desired fertility. The SDHS main report states that "although fertility in Sudan is low compared with most sub-Saharan countries, the desire for children is strong. One in three married women wants to have another child within two years and the same proportion wants another child in two or more years; only one in four married women wants to stop childbearing. The proportion of women who want no more children increases with family size and age.

The average ideal family size, 5.9 children, exceeds the total fertility rate (5.0) by approximately one child. Older women are more likely to want large families than younger women, and women just beginning their families say they want to have about five children" (Department of Statistics 1991, p. xvii). This phenomenon in Sudan requires more careful investigation and analyses.

### Fertility and Family Planning Policies

Fertility and family planning policies are determined, in part, by the government and its understanding of population issues. At the international population conference that was held in Bucharest in 1974 all delegates from countries in North Africa argued for development and were against family planning as a means for resolving population problems. Ten years later, in 1984, the political stand of these governments changed, and in 1994, some countries were in an advanced stage of population policy development. Tunisia and Egypt were the first countries in North Africa to express concern about fertility, set fertility targets and specify measures and plans to achieve them.

The Tunisian government restricted polygamy in 1956, introduced family planning in the early 1960s, and adopted a flexible stand on abortion. These measures were strengthened further through improving women's education and increasing women's participation in modern activities. On the other hand, the official stand of the Egyptian government progressed from skepticism to sureness. During the 1960s and 1970s, population growth and its ramifications were seen as long-term problems undeniably important, but neither pressing nor urgent (Waterbury 1975). Population issues were of secondary importance. This situation has changed considerably in recent years. The government in Egypt has recently supported population and family planning more actively than ever before. Consequently, the use of contraceptive methods increased to about 47% in 1992, 37 percentage points more than in 1960.

Compared to Tunisia and Egypt, fertility and family planning policies in Morocco and Algeria are relatively recent. In Morocco the government started to support family planning in 1968, for women aged 28 years or more with at least four children (Sayed 1993). In Algeria the government did not endorse family planning until 1983, when it ensured that the services should be available to the entire population. Also, the population programs in Sudan and Libya are at infancy. In Sudan there is as yet no clear understanding of the population issues of the country. While some observers express alarm at the rapid rate of population growth, others applaud it as a means to solve what they claim is becoming a severe problem of labor shortage in the agricultural sector. Fertility in Sudan declined primarily because of increasing age at marriage due to increasing school attendance and the migration of males. However, the slow pace of fertility decline is mainly due to low women's education.

## MORTALITY

Unlike fertility and family planning, mortality involves fewer controversial issues, probably because of its lower sensitivity to cultural and religious factors. However, in pure development terms, health and mortality are part of social welfare programs. They are closely linked to social development and the quality of life. Social development activities and services often are organized by place of residence. Rural residents have poor health and higher mortality levels primarily because of a lack of medical services and a poor health environment. Also, mortality is directly linked to the disease environment. Many diseases, such as malaria and tuberculosis, are influenced by ecological zones and local climate conditions. Environmental hazards at global and local levels, such as ozone layer depletion and air pollution, may also directly affect health and mortality. Therefore, mortality and health are more likely to be sensitive to environmental degradation than fertility (Lutz 1994). These aspects, together, are very important to consider when thinking about the role of mortality in future population trends.

## Mortality Patterns and Differentials

Death rates are usually higher at infancy and old age than in the prime age groups. As in other regions, age specific mortality rates in North Africa diminish rapidly to age 4, then slowly to ages 5-9 (See Appendix A). Thereafter, mortality stays at a very low level to age group 45-49. After that the level increases at an accelerating rate. Mortality rates are very low, usually below 10 per 1000 population, for children 5-9 and 10-14 years and for adults 15-49 years of age. By contrast, starting approximately from age group 50-54 for males and 55-59 for females, mortality rates increase to levels above 10 per 1000 population. Thereafter the rates increase to large two digits in the age groups to 70-74 and three digits, in most cases exceeding the rate at infancy, for the open-end age intervals (75+ and 80+).

Infants are a special group highly vulnerable to the risk of death, because newborn babies are fragile and totally dependent on others for support to survive. Infant mortality is a very sensitive indicator of social development. As the standard of living goes up, so does the average level of health, and the health of babies improves faster and earlier than adults (Weeks 1994). Infant mortality was high and slowly declining in all countries in North Africa during the 1950s and 1960s. It declined more rapidly during the 1970s and 1980s (Table 6). The trend of the infant mortality rate shows a rapid downward pattern (Figure 4, Panel 4).

Table 6. Infant mortality rates. Source: UNECA 1992, Table 13.

| Period | Algeria | Egypt | Libya | Morocco | Sudan | Tunisia |
|---|---|---|---|---|---|---|
| 1950-1955 | 185 | 200 | 185 | 180 | 185 | 175 |
| 1955-1960 | 175 | 183 | 170 | 170 | 170 | 163 |
| 1960-1965 | 160 | 175 | 150 | 155 | 150 | 155 |
| 1965-1970 | 150 | 170 | 130 | 138 | 130 | 138 |
| 1970-1975 | 132 | 150 | 117 | 122 | 110 | 120 |
| 1975-1980 | 112 | 131 | 107 | 110 | 97 | 88 |
| 1980-1985 | 88 | 115 | 97 | 97 | 92 | 71 |
| 1985-1990 | 67 | 81 | 82 | 82 | 85 | 49 |
| 1990-1995* | 55 | 67 | 68 | 68 | 78 | 43 |

* UN Population Division estimates for 1990-95 (The 1994 Revision) median variant projections.

Another population group at high risk of death are women during pregnancy and child birth. In 1986 the WHO estimated maternal mortality in Africa to be at a rate of 640 per 100,000 live births. Maternal mortality is considered a major public health issue in all countries in North Africa, particularly in rural areas where pregnancy is more frequent. Recent studies (Makhlouf et al. 1994) indicate that the rate of maternal mortality in Egypt was high during the 1960s and 1970s, and declined to 320 per 100,000 live births in 1986 and to 266 in 1991. The same rate was 332 in Morocco in 1992 and 552 in Sudan in the period 1983-89. With increasing age at marriage and increased use of contraceptive methods, maternal mortality is likely to decline to low levels in the future.

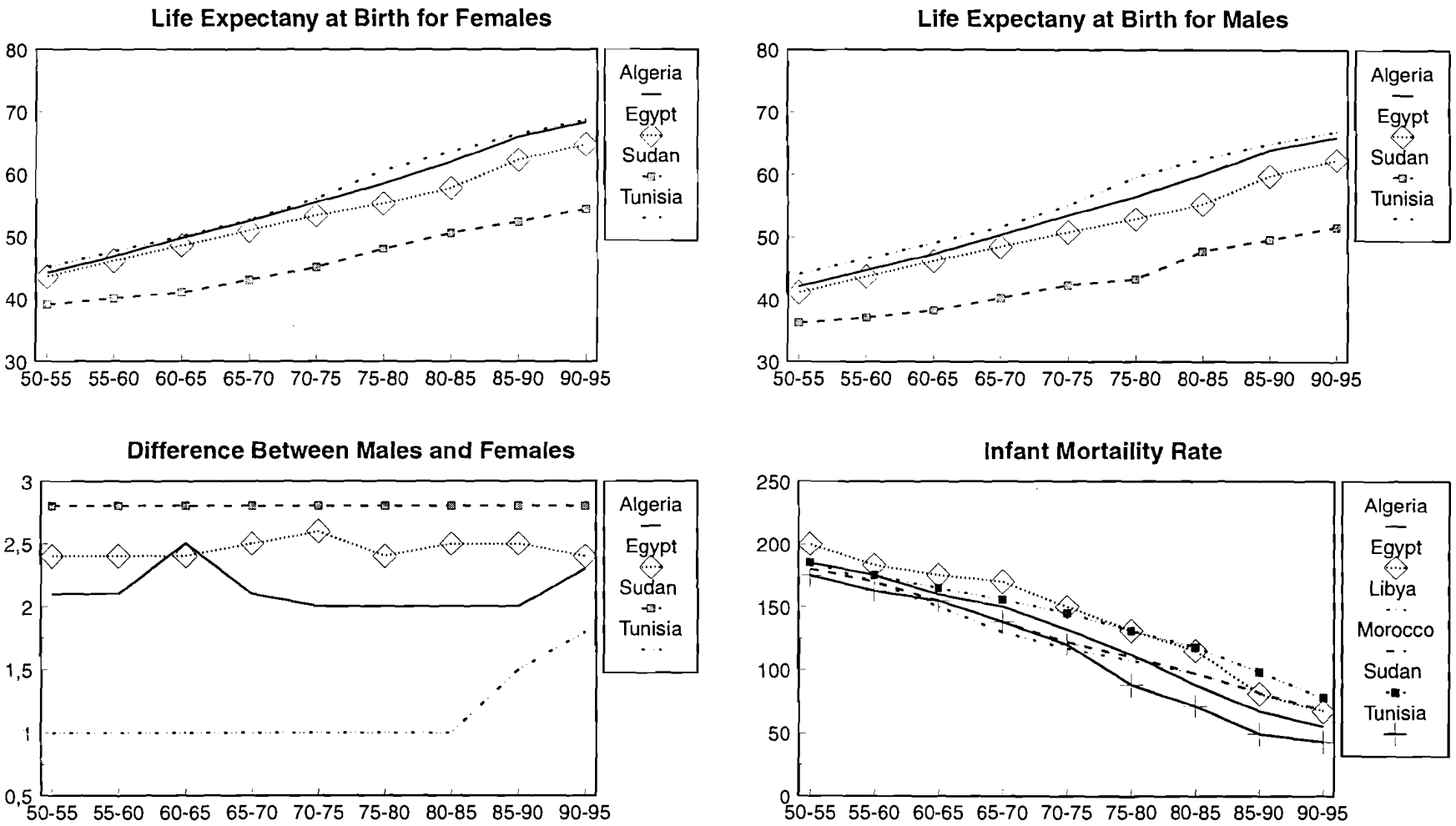


Figure 4. Trend in life expectancy at birth and infant mortality rate.

Gender differences in mortality are well established worldwide. Generally, women live longer than men primarily because of biological and social factors. Higher rate of heart disease for men, combined with men's higher risk behaviors, account for most of the difference in the gender gap (Weeks 1994). Data from North Africa show very low differences in life expectancy at birth by sex. These are shown in Table 7, and the difference over the period between 1950-1990 is depicted in Figure 4. Gender difference is almost constant in the range of 1 to 2.8 years for the entire period 1950-1990. Appendix life tables calculated by this author (Appendix A) show similar low sex differences in life expectancy at birth except for Sudan, where women outlived men by about 3 years. Gender difference in life expectancy at birth in Egypt indicates that women outlived men by about 6 years during the period between 1936 and 1949, and about 2.5 years during the 1950s, 1960s, 1970s, and 1980s. More recently this difference increased to 3.4 years in 1991. Egypt is the only country in North Africa for which gender mortality by place of residence (urban/rural) is available. Gender difference in life expectancy at birth for urban areas was 2.3 years in 1976. It increased to about 3 years in 1986. By contrast, the difference in rural areas was about 3.1 in 1976 and declined to 2.3 in 1986. These differences suggest that the gender gap is widening in urban areas and narrowing in rural ones.

Table 7. Life expectancy at birth by sex. Source: UN 1993, Table 7.

| Period | Algeria | | Egypt | | Libya | | Morocco | | Sudan | | Tunisia | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F | M | F | M | F | M | F | M | F | M | F | M |
| 1950-1955 | 44.2 | 42.1 | 43.6 | 41.2 | 43.9 | 41.9 | 43.9 | 41.9 | 39.1 | 36.3 | 45.1 | 44.1 |
| 1955-1960 | 46.8 | 44.7 | 46.1 | 43.7 | 46.6 | 44.3 | 46.6 | 44.3 | 40.1 | 37.3 | 47.6 | 46.6 |
| 1960-1965 | 49.8 | 47.3 | 48.6 | 46.2 | 49.2 | 46.7 | 49.2 | 46.7 | 41.1 | 38.3 | 50.1 | 49.1 |
| 1965-1970 | 52.5 | 50.4 | 51.0 | 48.5 | 51.8 | 49.0 | 51.8 | 49.0 | 43.1 | 40.3 | 52.6 | 51.6 |
| 1970-1975 | 55.5 | 53.5 | 53.4 | 50.8 | 54.5 | 51.4 | 54.5 | 51.4 | 45.1 | 42.3 | 56.1 | 55.1 |
| 1975-1980 | 58.5 | 56.5 | 55.3 | 52.9 | 57.5 | 54.1 | 57.5 | 54.1 | 48.1 | 45.3 | 60.6 | 59.6 |
| 1980-1985 | 62.0 | 60.0 | 57.8 | 55.3 | 60.0 | 56.6 | 60.0 | 56.6 | 50.6 | 47.8 | 63.6 | 62.6 |
| 1985-1990 | 66.0 | 64.0 | 62.3 | 59.8 | 62.5 | 59.1 | 62.5 | 59.1 | 52.4 | 49.6 | 66.4 | 64.9 |
| 1990-1995* | 68.3 | 66.0 | 64.8 | 62.4 | 65.0 | 61.6 | 65.0 | 61.6 | 54.4 | 51.6 | 68.7 | 66.9 |

* UN Population Division estimates for 1990-95 (The 1994 Revision) median variant projections.

Mortality in North Africa has improved quite rapidly in the last three decades (Tables 6 and 7). The most rapid decline has been in the four Maghreb countries (Algeria, Libya, Morocco, Tunisia). During the period 1950-55 to 1990-95, life expectancy at birth for females increased by about 24.1 years for Algeria and 23.6 years for Tunisia, compared to 23.9 and 22.8 for males in the same countries, respectively. In Egypt, life expectancy at birth increased by 6.9 years for males and females for the period between 1976 and 1986 (See Appendix A). Thereafter (1986-1991), females gained slightly more years of life than males. By improving women's status, increasing women's education, spreading family planning, and declining fertility rates, women's life expectancy is likely to improve more.

Mortality improvement in Egypt between 1976 and 1986 was greater for the rural than the urban population. Life expectancy at birth increased by 8.2 and 7.4 years for rural males and females, and by 5.0 and 5.8 for their urban counterparts, respectively (See Appendix A). The gain in years of life is higher in rural than urban areas; three years more than the gains achieved during the same period by men and women in urban areas. It might be true that cities are unhealthy to live in. Proximity of rural areas to urban centers may facilitate access of rural inhabitants to modern health facilities. It is

possible that these improvements in mortality are distorted somewhat by misclassification of death events by place of occurrence and place of usual residence.

Mortality in Sudan has declined slowly, but its level still is high. Life expectancy at birth improved by about 7.3 years for males and females in the period 1970-75 to 1985-90. In view of the fact that infectious diseases, particularly malaria, are still widespread, the small decline in mortality in Sudan is not unexpected. Health development in Sudan is hampered by internal war, famine and drought. Political and social development efforts for a considerable period of time are needed to repair the damage caused by three decades of civil war and frequent famines and droughts.

## FUTURE DEMOGRAPHIC PROSPECTS

The six countries in North Africa provide an example of moderate and slow demographic development. One important aspect of this demographic pattern is that fertility was sustained at a high level for about two decades. This undoubtedly will shape the demographic situation for several years to come. In the first place, high fertility produced a young age structure which is often associated with high momentum of population growth. Potential mothers for several decades to come have already been born. Therefore, the recent decline in fertility in the countries in North Africa will not have its full demographic impact for several years. Also, with sustained high fertility, the age composition of the population will be dominated by those 15 years or younger. The social consequences of a young age structure are inevitable, particularly the pressure on services and the increasing demand for education.

On the other hand, mortality decline in each of the countries in North Africa is impressive. All governments in this region implemented maternal and child health programs based on simple and low cost health technology. For example, immunization and oral rehydration therapy became widespread. The demographic impact of these health programs have not yet been fully assessed. However, they are likely to lead to substantial decline in infant and child mortality. Infant mortality may decline further to a level below 20 deaths per 1000 live births in Tunisia and Egypt, and below 40 in Morocco, Algeria, Libya, and the Sudan.

Another aspect of change in North Africa is the widening rural urban demographic differences. Basically there are two demographic regimes in each country: a rural high fertility regime and an urban low fertility regime. In both regimes mortality is declining. The use of contraceptive methods is substantially higher in the urban regime as compared to the rural. It is in rural areas where the greatest demographic challenge for governments in North Africa lies. Egypt provides a good example where the government has set a national goal of achieving 2 children per couple by the year 2015. Fertility has been projected to decline from 3.9 in 1992 to 2.9 in 2005 to 2.1 in 2015 (Khalifa 1994). To achieve replacement fertility, the use of contraceptive methods is targeted to reach a high level of about 74%. However, the main challenge for realizing these national goals lies in rural areas, particularly in upper Egypt, where fertility is high and the potential for decline is the greatest.

With differences in environment, social, and economic development, and varying political support of national population programs and activities, demographic change in these countries is bound to take a more divergent course than ever before. There are two powerful forces of demographic change in North Africa. On the one hand, there is social development and increasing government support of women's education, population and family planning programs. On the other hand, there are political, religious and cultural barriers to fertility decline. These forces, when viewed together, provide considerable uncertainties about future population trends. The degree of uncertainty varies from country to country, and within each country, from rural to urban areas. The downward trend in fertility in urban areas is irreversible, particularly in Egypt, Tunisia, and Morocco. In the 1980s Tunisia's population

targets were to reach an annual growth rate of 1.8% by 2001 and 1.1% by 2021 primarily through more use of contraceptive methods and a social program of better education and improving status of women (Sayed 1993). Fertility in Tunisia is likely to reach replacement level before any other country in the region.

Future population trends are associated with substantial uncertainties in Algeria, Libya, and the Sudan. With spreading pronatalistic views and programs, fertility in Algeria and Sudan may increase, particularly in rural areas. This is one extreme scenario which is not unusual in the Arab countries. For example, fertility in Egypt increased in the late 1970s and mid-1980s before it declined in the late 1980s. Another possible scenario for fertility in these countries is to follow a downward pattern in response to social development, increasing women's education, and the greater use of contraceptive methods. However, replacement fertility is very difficult to achieve, particularly in rural areas. In Libya, the all time high fertility level is unlikely to continue for long in the future. The changing Libyan economy, urbanization, improving women status, education and social change are likely to bring about a moderate decline in fertility.

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## APPENDIX A: Life Tables for Countries in North Africa

Algeria Males 1982

| | | | | k0 = | 0.33 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | k1 = | 1.24 | | | |
| Age | Mx | qx | Px | lx | Lx | Tx | ex | |
| <1 | 105.10 | 0.100 | 0.900 | 100000 | 93310 | 5967149 | 59.67 | |
| 1-4 | 12.50 | 0.049 | 0.951 | 90015 | 347940 | 5873839 | 65.25 | |
| 5-9 | 1.90 | 0.009 | 0.991 | 85624 | 425892 | 5525899 | 64.54 | |
| 10-14 | 1.20 | 0.006 | 0.994 | 84814 | 422853 | 5100006 | 60.13 | |
| 15-19 | 1.80 | 0.009 | 0.991 | 84307 | 419721 | 4677153 | 55.48 | |
| 20-24 | 2.90 | 0.014 | 0.986 | 83551 | 414871 | 4257432 | 50.96 | |
| 25-29 | 3.00 | 0.015 | 0.985 | 82349 | 408801 | 3842561 | 46.66 | |
| 30-34 | 4.00 | 0.020 | 0.980 | 81123 | 401758 | 3433760 | 42.33 | |
| 35-39 | 6.10 | 0.030 | 0.970 | 79516 | 391848 | 3032003 | 38.13 | |
| 40-44 | 7.10 | 0.035 | 0.965 | 77127 | 379181 | 2640154 | 34.23 | |
| 45-49 | 8.10 | 0.040 | 0.960 | 74437 | 365094 | 2260974 | 30.37 | |
| 50-54 | 11.30 | 0.055 | 0.945 | 71482 | 347985 | 1895880 | 26.52 | |
| 55-59 | 16.70 | 0.080 | 0.920 | 67555 | 324777 | 1547895 | 22.91 | |
| 60-64 | 23.20 | 0.110 | 0.890 | 62140 | 294348 | 1223118 | 19.68 | |
| 65-69 | 34.00 | 0.157 | 0.843 | 55327 | 255829 | 928770 | 16.79 | |
| 70-74 | 43.10 | 0.195 | 0.805 | 46658 | 211506 | 672941 | 14.42 | |
| 75-79 | 67.90 | 0.290 | 0.710 | 37581 | 161729 | 461436 | 12.28 | |
| 80+ | 89.00 | 0.364 | 0.636 | 26674 | 299707 | 299707 | 11.24 | |

Algeria Females 1982

| | | | | k0 = | 0.30428773 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | k1 = | 1.33964646 | | | |
| Age | Mx | qx | Px | lx | Lx | Tx | ex | |
| <1 | 95.40 | 0.091 | 0.909 | 100000 | 93665 | 6256994 | 62.57 | |
| 1-4 | 12.80 | 0.050 | 0.950 | 90894 | 351506 | 6163329 | 67.81 | |
| 5-9 | 2.00 | 0.010 | 0.990 | 86357 | 429421 | 5811824 | 67.30 | |
| 10-14 | 1.20 | 0.006 | 0.994 | 85497 | 426260 | 5382403 | 62.95 | |
| 15-19 | 1.80 | 0.009 | 0.991 | 84986 | 423102 | 4956143 | 58.32 | |
| 20-24 | 2.50 | 0.012 | 0.988 | 84225 | 418612 | 4533041 | 53.82 | |
| 25-29 | 2.90 | 0.014 | 0.986 | 83178 | 413018 | 4114429 | 49.47 | |
| 30-34 | 3.30 | 0.016 | 0.984 | 81981 | 406684 | 3701412 | 45.15 | |
| 35-39 | 4.40 | 0.022 | 0.978 | 80639 | 398985 | 3294727 | 40.86 | |
| 40-44 | 4.60 | 0.023 | 0.977 | 78884 | 390118 | 2895742 | 36.71 | |
| 45-49 | 5.00 | 0.025 | 0.975 | 77091 | 380886 | 2505625 | 32.50 | |
| 50-54 | 7.00 | 0.034 | 0.966 | 75187 | 369729 | 2124739 | 28.26 | |
| 55-59 | 10.60 | 0.052 | 0.948 | 72601 | 354009 | 1755010 | 24.17 | |
| 60-64 | 16.50 | 0.079 | 0.921 | 68852 | 331170 | 1401001 | 20.35 | |
| 65-69 | 27.50 | 0.129 | 0.871 | 63397 | 297411 | 1069831 | 16.88 | |
| 70-74 | 38.80 | 0.177 | 0.823 | 55241 | 252758 | 772421 | 13.98 | |
| 75-79 | 64.20 | 0.277 | 0.723 | 45472 | 197172 | 519662 | 11.43 | |
| 80+ | 102.00 | 0.406 | 0.594 | 32894 | 322490 | 322490 | 9.80 | |

Algeria Males 1989

| Age | qx | Px | lx | Lx | Tx | ex | |
|---|---|---|---|---|---|---|---|
| <1 | 0.062 | 0.938 | 100000 | 93810 | 6613470 | 66.13 | |
| 1-4 | 0.010 | 0.991 | 93810 | 372982 | 6519660 | 69.50 | |
| 5-9 | 0.007 | 0.994 | 92919 | 463084 | 6146678 | 66.15 | |
| 10-14 | 0.006 | 0.994 | 92315 | 460189 | 5683594 | 61.57 | |
| 15-19 | 0.007 | 0.993 | 91761 | 457199 | 5223405 | 56.92 | |
| 20-24 | 0.007 | 0.993 | 91119 | 454044 | 4766206 | 52.31 | |
| 25-29 | 0.008 | 0.992 | 90499 | 450753 | 4312162 | 47.65 | |
| 30-34 | 0.009 | 0.992 | 89802 | 447102 | 3861409 | 43.00 | |
| 35-39 | 0.011 | 0.989 | 89039 | 442650 | 3414307 | 38.35 | |
| 40-44 | 0.014 | 0.986 | 88024 | 436950 | 2971657 | 33.76 | |
| 45-49 | 0.019 | 0.981 | 86756 | 429704 | 2534707 | 29.22 | |
| 50-54 | 0.028 | 0.972 | 85125 | 419646 | 2105003 | 24.73 | |
| 55-59 | 0.047 | 0.953 | 82733 | 403965 | 1685357 | 20.37 | |
| 60-64 | 0.064 | 0.936 | 78853 | 381566 | 1281392 | 16.25 | |
| 65-69 | 0.129 | 0.871 | 73773 | 345056 | 899826 | 12.20 | |
| 70-74 | 0.189 | 0.811 | 64249 | 290920 | 554770 | 8.63 | |
| 75-79 | 0.276 | 0.724 | 52119 | 224633 | 263850 | 5.06 | |
| 80+ | 1.000 | 0.000 | 37734 | 39217 | 39217 | 1.04 | |

Source: National Board of Statistics (1991) Statistical Yearbook of Algeria No 15

Algeria Females 1989

| Age | qx | Px | lx | Lx | Tx | ex | |
|---|---|---|---|---|---|---|---|
| <1 | 0.055 | 0.945 | 100000 | 95658 | 6648151 | 66.48 | |
| 1-4 | 0.010 | 0.990 | 94460 | 375343 | 6552493 | 69.37 | |
| 5-9 | 0.007 | 0.993 | 93487 | 465799 | 6177150 | 66.07 | |
| 10-14 | 0.005 | 0.995 | 92833 | 463003 | 5711351 | 61.52 | |
| 15-19 | 0.006 | 0.995 | 92368 | 460572 | 5248348 | 56.82 | |
| 20-24 | 0.006 | 0.994 | 91860 | 457924 | 4787776 | 52.12 | |
| 25-29 | 0.008 | 0.993 | 91309 | 454834 | 4329852 | 47.42 | |
| 30-34 | 0.010 | 0.991 | 90624 | 450970 | 3875018 | 42.76 | |
| 35-39 | 0.013 | 0.987 | 89764 | 445923 | 3424048 | 38.15 | |
| 40-44 | 0.016 | 0.984 | 88606 | 439395 | 2978125 | 33.61 | |
| 45-49 | 0.019 | 0.981 | 87152 | 431666 | 2538730 | 29.13 | |
| 50-54 | 0.028 | 0.972 | 85514 | 421563 | 2107064 | 24.64 | |
| 55-59 | 0.046 | 0.954 | 83111 | 406018 | 1685501 | 20.28 | |
| 60-64 | 0.054 | 0.946 | 79296 | 385852 | 1279483 | 16.14 | |
| 65-69 | 0.141 | 0.859 | 75044 | 348806 | 893631 | 11.91 | |
| 70-74 | 0.195 | 0.805 | 64478 | 290990 | 544825 | 8.45 | |
| 75-79 | 0.305 | 0.695 | 51918 | 220015 | 253835 | 4.89 | |
| 80+ | 1.000 | 0.000 | 36088 | 33820 | 33820 | 0.94 | |

## Egypt Males 1976

k0 = 0.33
k1 = 1.24

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 172.50 | 0.159 | 0.841 | 100000 | 89360 | 5131283 | 51.31 |
| 1-4 | 15.60 | 0.061 | 0.939 | 84120 | 322430 | 5041923 | 59.94 |
| 5-9 | 2.10 | 0.010 | 0.990 | 79029 | 392877 | 4719493 | 59.72 |
| 10-14 | 1.90 | 0.009 | 0.991 | 78204 | 389245 | 4326616 | 55.32 |
| 15-19 | 2.00 | 0.010 | 0.990 | 77465 | 385473 | 3937371 | 50.83 |
| 20-24 | 2.70 | 0.013 | 0.987 | 76694 | 381000 | 3551898 | 46.31 |
| 25-29 | 3.20 | 0.016 | 0.984 | 75665 | 375444 | 3170898 | 41.91 |
| 30-34 | 3.20 | 0.016 | 0.984 | 74464 | 369485 | 2795454 | 37.54 |
| 35-39 | 4.60 | 0.023 | 0.977 | 73282 | 362412 | 2425969 | 33.10 |
| 40-44 | 5.80 | 0.029 | 0.971 | 71616 | 353167 | 2063557 | 28.81 |
| 45-49 | 9.80 | 0.048 | 0.952 | 69569 | 339858 | 1710390 | 24.59 |
| 50-54 | 14.90 | 0.072 | 0.928 | 66241 | 319789 | 1370532 | 20.69 |
| 55-59 | 23.10 | 0.109 | 0.891 | 61484 | 291306 | 1050743 | 17.09 |
| 60-64 | 29.70 | 0.138 | 0.862 | 54770 | 255679 | 759438 | 13.87 |
| 65-69 | 58.30 | 0.254 | 0.746 | 47199 | 207174 | 503759 | 10.67 |
| 70-74 | 73.70 | 0.311 | 0.689 | 35191 | 149673 | 296584 | 8.43 |
| 75+ | 165.00 | 0.584 | 0.416 | 24240 | 146912 | 146912 | 6.06 |

## Egypt Females 1976

k0 = 0.35
k1 = 1.239

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 173.2 | 0.159 | 0.841 | 100000 | 89639 | 5410850 | 54.11 |
| 1-4 | 19.1 | 0.074 | 0.926 | 84060 | 319162 | 5321211 | 63.30 |
| 5-9 | 1.7 | 0.008 | 0.992 | 77874 | 387560 | 5002049 | 64.23 |
| 10-14 | 1.3 | 0.006 | 0.994 | 77215 | 384876 | 4614489 | 59.76 |
| 15-19 | 1.5 | 0.007 | 0.993 | 76715 | 382200 | 4229613 | 55.13 |
| 20-24 | 1.5 | 0.007 | 0.993 | 76142 | 379344 | 3847414 | 50.53 |
| 25-29 | 2.1 | 0.010 | 0.990 | 75573 | 375970 | 3468070 | 45.89 |
| 30-34 | 2.1 | 0.010 | 0.990 | 74784 | 372043 | 3092100 | 41.35 |
| 35-39 | 2.8 | 0.014 | 0.986 | 74002 | 367543 | 2720057 | 36.76 |
| 40-44 | 2.8 | 0.014 | 0.986 | 72974 | 362433 | 2352514 | 32.24 |
| 45-49 | 5.1 | 0.025 | 0.975 | 71959 | 355447 | 1990081 | 27.66 |
| 50-54 | 7.3 | 0.036 | 0.964 | 70147 | 344701 | 1634634 | 23.30 |
| 55-59 | 11.7 | 0.057 | 0.943 | 67633 | 328938 | 1289933 | 19.07 |
| 60-64 | 15.7 | 0.076 | 0.924 | 63789 | 307379 | 960995 | 15.07 |
| 65-69 | 38.8 | 0.177 | 0.823 | 58970 | 269823 | 653616 | 11.08 |
| 70-74 | 49.5 | 0.220 | 0.780 | 48542 | 217050 | 383793 | 7.91 |
| 75+ | 227 | 0.724 | 0.276 | 37851 | 166743 | 166743 | 4.41 |

## Egypt Males 1986

k0 = 0.31317848
k1 = 1.33032895

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 98.80 | 0.094 | 0.906 | 100000 | 93534 | 5822173 | 58.22 |
| 1-4 | 7.00 | 0.028 | 0.972 | 90585 | 355663 | 5728640 | 63.24 |
| 5-9 | 1.70 | 0.008 | 0.992 | 88084 | 438368 | 5372977 | 61.00 |
| 10-14 | 1.10 | 0.005 | 0.995 | 87338 | 435541 | 4934609 | 56.50 |
| 15-19 | 1.40 | 0.007 | 0.993 | 86859 | 432842 | 4499068 | 51.80 |
| 20-24 | 2.00 | 0.010 | 0.990 | 86253 | 429206 | 4066226 | 47.14 |
| 25-29 | 2.40 | 0.012 | 0.988 | 85395 | 424530 | 3637019 | 42.59 |
| 30-34 | 2.90 | 0.014 | 0.986 | 84376 | 418967 | 3212489 | 38.07 |
| 35-39 | 3.60 | 0.018 | 0.982 | 83162 | 412248 | 2793522 | 33.59 |
| 40-44 | 4.00 | 0.020 | 0.980 | 81678 | 404509 | 2381274 | 29.15 |
| 45-49 | 7.50 | 0.037 | 0.963 | 80061 | 393231 | 1976765 | 24.69 |
| 50-54 | 13.60 | 0.066 | 0.934 | 77114 | 373398 | 1583534 | 20.54 |
| 55-59 | 26.30 | 0.123 | 0.877 | 72042 | 338878 | 1210136 | 16.80 |
| 60-64 | 29.70 | 0.138 | 0.862 | 63153 | 294814 | 871258 | 13.80 |
| 65-69 | 60.70 | 0.264 | 0.736 | 54423 | 237697 | 576444 | 10.59 |
| 70-74 | 73.60 | 0.311 | 0.689 | 40082 | 170511 | 338746 | 8.45 |
| 75+ | 164.20 | 0.582 | 0.418 | 27624 | 168235 | 168235 | 6.09 |

## Egypt Females 1986

k0 = 0.31194233
k1 = 1.34493994

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 91.3 | 0.087 | 0.913 | 100000 | 93992 | 6098665 | 60.99 |
| 1-4 | 7.6 | 0.030 | 0.970 | 91269 | 357818 | 6004672 | 65.79 |
| 5-9 | 1.5 | 0.007 | 0.993 | 88536 | 440859 | 5646854 | 63.78 |
| 10-14 | 0.9 | 0.004 | 0.996 | 87874 | 438423 | 5205996 | 59.24 |
| 15-19 | 1.1 | 0.005 | 0.995 | 87479 | 436246 | 4767573 | 54.50 |
| 20-24 | 1.3 | 0.006 | 0.994 | 87000 | 433646 | 4331327 | 49.79 |
| 25-29 | 1.7 | 0.008 | 0.992 | 86436 | 430424 | 3897681 | 45.09 |
| 30-34 | 2 | 0.010 | 0.990 | 85704 | 426475 | 3467257 | 40.46 |
| 35-39 | 2.7 | 0.013 | 0.987 | 84852 | 421527 | 3040782 | 35.84 |
| 40-44 | 2.7 | 0.013 | 0.987 | 83714 | 415875 | 2619254 | 31.29 |
| 45-49 | 5 | 0.025 | 0.975 | 82591 | 408062 | 2203379 | 26.68 |
| 50-54 | 8.8 | 0.043 | 0.957 | 80552 | 394437 | 1795317 | 22.29 |
| 55-59 | 17.8 | 0.085 | 0.915 | 77084 | 369656 | 1400881 | 18.17 |
| 60-64 | 19.9 | 0.095 | 0.905 | 70516 | 336538 | 1031225 | 14.62 |
| 65-69 | 51.8 | 0.229 | 0.771 | 63832 | 284031 | 694687 | 10.88 |
| 70-74 | 59.5 | 0.259 | 0.741 | 49195 | 215398 | 410656 | 8.35 |
| 75+ | 186.7 | 0.636 | 0.364 | 36455 | 195258 | 195258 | 5.36 |

## Egypt Urban Males 1976

k0 = 0.33
k1 = 1.24

| Age | Mx | qx | Px | lx | Lx | Tx | ex | Sx |
|---|---|---|---|---|---|---|---|---|
| <1 | 173.10 | 0.159 | 0.841 | 100000 | 89326 | 5284564 | 52.85 | 0.831 |
| 1-4 | 11.30 | 0.044 | 0.956 | 84069 | 326019 | 5195238 | 61.80 | 0.963 |
| 5-9 | 1.80 | 0.009 | 0.991 | 80353 | 399785 | 4869218 | 60.60 | 0.992 |
| 10-14 | 1.60 | 0.008 | 0.992 | 79633 | 396642 | 4469434 | 56.13 | 0.991 |
| 15-19 | 2.00 | 0.010 | 0.990 | 78998 | 393106 | 4072792 | 51.56 | 0.988 |
| 20-24 | 3.00 | 0.015 | 0.985 | 78212 | 388267 | 3679686 | 47.05 | 0.985 |
| 25-29 | 3.20 | 0.016 | 0.984 | 77048 | 382305 | 3291419 | 42.72 | 0.985 |
| 30-34 | 2.90 | 0.014 | 0.986 | 75825 | 376505 | 2909114 | 38.37 | 0.983 |
| 35-39 | 4.10 | 0.020 | 0.980 | 74733 | 370027 | 2532609 | 33.89 | 0.977 |
| 40-44 | 5.20 | 0.026 | 0.974 | 73217 | 361574 | 2162582 | 29.54 | 0.967 |
| 45-49 | 8.60 | 0.042 | 0.958 | 71338 | 349481 | 1801007 | 25.25 | 0.947 |
| 50-54 | 13.50 | 0.065 | 0.935 | 68335 | 330965 | 1451526 | 21.24 | 0.918 |
| 55-59 | 21.20 | 0.101 | 0.899 | 63873 | 303932 | 1120561 | 17.54 | 0.883 |
| 60-64 | 29.50 | 0.137 | 0.863 | 57443 | 268277 | 816628 | 14.22 | 0.815 |
| 65-69 | 55.90 | 0.245 | 0.755 | 49552 | 218597 | 548351 | 11.07 | 0.729 |
| 70-74 | 72.80 | 0.308 | 0.692 | 37400 | 159360 | 329755 | 8.82 | 0.517 |
| 75+ | 151.90 | 0.550 | 0.450 | 25883 | 170394 | 170394 | 6.58 | 0.358 |

## Egypt Urban Females 1976

k0 = 0.35
k1 = 1.239

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 171.4 | 0.158 | 0.842 | 100000 | 89738 | 5515717 | 55.16 |
| 1-4 | 13.3 | 0.052 | 0.948 | 84213 | 324803 | 5425978 | 64.43 |
| 5-9 | 1.4 | 0.007 | 0.993 | 79849 | 397713 | 5101176 | 63.89 |
| 10-14 | 1.1 | 0.005 | 0.995 | 79292 | 395416 | 4703463 | 59.32 |
| 15-19 | 1.6 | 0.008 | 0.992 | 78857 | 392777 | 4308047 | 54.63 |
| 20-24 | 1.6 | 0.008 | 0.992 | 78229 | 389647 | 3915270 | 50.05 |
| 25-29 | 2.1 | 0.010 | 0.990 | 77605 | 386081 | 3525623 | 45.43 |
| 30-34 | 2.2 | 0.011 | 0.989 | 76795 | 381957 | 3139542 | 40.88 |
| 35-39 | 3.2 | 0.016 | 0.984 | 75955 | 376880 | 2757584 | 36.31 |
| 40-44 | 3.3 | 0.016 | 0.984 | 74749 | 370809 | 2380705 | 31.85 |
| 45-49 | 5.5 | 0.027 | 0.973 | 73526 | 362842 | 2009896 | 27.34 |
| 50-54 | 7.8 | 0.038 | 0.962 | 71531 | 351089 | 1647054 | 23.03 |
| 55-59 | 12.9 | 0.062 | 0.938 | 68795 | 333657 | 1295965 | 18.84 |
| 60-64 | 17.5 | 0.084 | 0.916 | 64496 | 309504 | 962308 | 14.92 |
| 65-69 | 44.2 | 0.199 | 0.801 | 59089 | 267224 | 652804 | 11.05 |
| 70-74 | 55.1 | 0.242 | 0.758 | 47330 | 209144 | 385579 | 8.15 |
| 75+ | 203.3 | 0.674 | 0.326 | 35869 | 176435 | 176435 | 4.92 |

## Egypt Urban Males 1986

k0 = 0.29799451
k1 = 1.34624176

| Age | Mx | qx | Px | lx | Lx | Tx | ex | Sx |
|---|---|---|---|---|---|---|---|---|
| <1 | 93.00 | 0.089 | 0.911 | 100000 | 93761 | 5785720 | 57.86 | 0.906 |
| 1-4 | 5.50 | 0.022 | 0.978 | 91113 | 359191 | 5691959 | 62.47 | 0.979 |
| 5-9 | 1.70 | 0.008 | 0.992 | 89131 | 443578 | 5332768 | 59.83 | 0.994 |
| 10-14 | 1.10 | 0.005 | 0.995 | 88376 | 440717 | 4889189 | 55.32 | 0.993 |
| 15-19 | 1.60 | 0.008 | 0.992 | 87891 | 437776 | 4448472 | 50.61 | 0.990 |
| 20-24 | 2.30 | 0.011 | 0.989 | 87191 | 433563 | 4010696 | 46.00 | 0.987 |
| 25-29 | 2.80 | 0.014 | 0.986 | 86194 | 428095 | 3577133 | 41.50 | 0.986 |
| 30-34 | 3.00 | 0.015 | 0.985 | 84996 | 421942 | 3149039 | 37.05 | 0.983 |
| 35-39 | 4.10 | 0.020 | 0.980 | 83730 | 414574 | 2727097 | 32.57 | 0.979 |
| 40-44 | 4.60 | 0.023 | 0.977 | 82031 | 405680 | 2312523 | 28.19 | 0.969 |
| 45-49 | 8.20 | 0.040 | 0.960 | 80166 | 393100 | 1906843 | 23.79 | 0.944 |
| 50-54 | 15.40 | 0.074 | 0.926 | 76945 | 371034 | 1513743 | 19.67 | 0.898 |
| 55-59 | 28.90 | 0.135 | 0.865 | 71240 | 333159 | 1142709 | 16.04 | 0.852 |
| 60-64 | 35.80 | 0.164 | 0.836 | 61640 | 283893 | 809550 | 13.13 | 0.785 |
| 65-69 | 65.10 | 0.280 | 0.720 | 51512 | 222953 | 525657 | 10.20 | 0.697 |
| 70-74 | 81.40 | 0.338 | 0.662 | 37092 | 155355 | 302704 | 8.16 | 0.487 |
| 75+ | 166.60 | 0.588 | 0.412 | 24548 | 147348 | 147348 | 6.00 | 0.322 |

## Egypt Urban Females 1986

k0 = 0.27382671
k1 = 1.36561131

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 77.5 | 0.075 | 0.925 | 100000 | 94582 | 6092416 | 60.92 |
| 1-4 | 5.3 | 0.021 | 0.979 | 92539 | 365042 | 5997834 | 64.81 |
| 5-9 | 1.3 | 0.006 | 0.994 | 90598 | 451375 | 5632791 | 62.17 |
| 10-14 | 0.8 | 0.004 | 0.996 | 90011 | 449192 | 5181416 | 57.56 |
| 15-19 | 1.2 | 0.006 | 0.994 | 89652 | 446971 | 4732224 | 52.78 |
| 20-24 | 1.4 | 0.007 | 0.993 | 89115 | 444084 | 4285253 | 48.09 |
| 25-29 | 1.9 | 0.009 | 0.991 | 88494 | 440460 | 3841169 | 43.41 |
| 30-34 | 2.4 | 0.012 | 0.988 | 87657 | 435775 | 3400709 | 38.80 |
| 35-39 | 3.3 | 0.016 | 0.984 | 86611 | 429655 | 2964934 | 34.23 |
| 40-44 | 3.4 | 0.017 | 0.983 | 85194 | 422523 | 2535279 | 29.76 |
| 45-49 | 6.1 | 0.030 | 0.970 | 83758 | 412750 | 2112756 | 25.22 |
| 50-54 | 10.9 | 0.053 | 0.947 | 81242 | 395863 | 1700006 | 20.93 |
| 55-59 | 22.3 | 0.106 | 0.894 | 76931 | 365157 | 1304143 | 16.95 |
| 60-64 | 26.5 | 0.124 | 0.876 | 68806 | 323511 | 938986 | 13.65 |
| 65-69 | 62.3 | 0.270 | 0.730 | 60256 | 262304 | 615474 | 10.21 |
| 70-74 | 67.4 | 0.288 | 0.712 | 44016 | 189612 | 353171 | 8.02 |
| 75+ | 191.5 | 0.648 | 0.352 | 31321 | 163558 | 163558 | 5.22 |

## Egypt Rural Males 1976

k0 = 0.33
k1 = 1.24

| Sx | Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|---|
| 0.829 | <1 | 171.90 | 0.158 | 0.842 | 100000 | 89394 | 5035678 | 50.36 |
| 0.959 | 1-4 | 18.30 | 0.071 | 0.929 | 84171 | 320277 | 4946284 | 58.77 |
| 0.994 | 5-9 | 2.30 | 0.011 | 0.989 | 78227 | 388674 | 4626006 | 59.14 |
| 0.993 | 10-14 | 2.00 | 0.010 | 0.990 | 77332 | 384815 | 4237332 | 54.79 |
| 0.992 | 15-19 | 1.90 | 0.009 | 0.991 | 76563 | 381077 | 3852517 | 50.32 |
| 0.991 | 20-24 | 2.50 | 0.012 | 0.988 | 75839 | 376934 | 3471440 | 45.77 |
| 0.989 | 25-29 | 3.10 | 0.015 | 0.985 | 74897 | 371720 | 3094507 | 41.32 |
| 0.987 | 30-34 | 3.50 | 0.017 | 0.983 | 73745 | 365654 | 2722787 | 36.92 |
| 0.984 | 35-39 | 5.00 | 0.025 | 0.975 | 72466 | 358033 | 2357133 | 32.53 |
| 0.979 | 40-44 | 6.30 | 0.031 | 0.969 | 70676 | 348121 | 1999100 | 28.29 |
| 0.968 | 45-49 | 10.80 | 0.053 | 0.947 | 68484 | 333780 | 1650979 | 24.11 |
| 0.950 | 50-54 | 16.10 | 0.077 | 0.923 | 64884 | 312367 | 1317198 | 20.30 |
| 0.928 | 55-59 | 24.60 | 0.116 | 0.884 | 59863 | 282665 | 1004831 | 16.79 |
| 0.863 | 60-64 | 29.80 | 0.139 | 0.861 | 52926 | 247016 | 722166 | 13.64 |
| 0.783 | 65-69 | 60.10 | 0.261 | 0.739 | 45587 | 199351 | 475150 | 10.42 |
| 0.458 | 70-74 | 74.40 | 0.314 | 0.686 | 33677 | 143035 | 275799 | 8.19 |
| 0.347 | 75+ | 174.10 | 0.607 | 0.393 | 23114 | 132764 | 132764 | 5.74 |

## Egypt Rural Females 1976

k0 = 0.35
k1 = 1.239

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 174.8 | 0.161 | 0.839 | 100000 | 89551 | 5349266 | 53.49 |
| 1-4 | 22.7 | 0.087 | 0.913 | 83925 | 315574 | 5259715 | 62.67 |
| 5-9 | 1.9 | 0.009 | 0.991 | 76636 | 381185 | 4944141 | 64.52 |
| 10-14 | 1.4 | 0.007 | 0.993 | 75911 | 378284 | 4562956 | 60.11 |
| 15-19 | 1.4 | 0.007 | 0.993 | 75381 | 375645 | 4184672 | 55.51 |
| 20-24 | 1.5 | 0.007 | 0.993 | 74856 | 372935 | 3809027 | 50.89 |
| 25-29 | 2 | 0.010 | 0.990 | 74296 | 369707 | 3436092 | 46.25 |
| 30-34 | 2 | 0.010 | 0.990 | 73557 | 366028 | 3066385 | 41.69 |
| 35-39 | 2.6 | 0.013 | 0.987 | 72825 | 361868 | 2700357 | 37.08 |
| 40-44 | 2.4 | 0.012 | 0.988 | 71884 | 357364 | 2338489 | 32.53 |
| 45-49 | 4.7 | 0.023 | 0.977 | 71027 | 351176 | 1981124 | 27.89 |
| 50-54 | 6.9 | 0.034 | 0.966 | 69377 | 341239 | 1629949 | 23.49 |
| 55-59 | 10.9 | 0.053 | 0.947 | 67024 | 326587 | 1288710 | 19.23 |
| 60-64 | 14.6 | 0.070 | 0.930 | 63468 | 306614 | 962122 | 15.16 |
| 65-69 | 35.8 | 0.164 | 0.836 | 58998 | 271728 | 655508 | 11.11 |
| 70-74 | 46.4 | 0.208 | 0.792 | 49305 | 221926 | 383780 | 7.78 |
| 75+ | 241.3 | 0.753 | 0.247 | 39055 | 161854 | 161854 | 4.14 |

## Egypt Rural Males 1986

k0 = 0.3269803
k1 = 1.31586465

| Sx | Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|---|
| 0.919 | <1 | 104.10 | 0.099 | 0.901 | 100000 | 93340 | 5859508 | 58.60 |
| 0.982 | 1-4 | 8.10 | 0.032 | 0.968 | 90105 | 352709 | 5766168 | 63.99 |
| 0.995 | 5-9 | 1.70 | 0.008 | 0.992 | 87232 | 434130 | 5413459 | 62.06 |
| 0.995 | 10-14 | 1.00 | 0.005 | 0.995 | 86494 | 431434 | 4979329 | 57.57 |
| 0.994 | 15-19 | 1.20 | 0.006 | 0.994 | 86062 | 429077 | 4547895 | 52.84 |
| 0.992 | 20-24 | 1.70 | 0.008 | 0.992 | 85548 | 426000 | 4118818 | 48.15 |
| 0.989 | 25-29 | 2.10 | 0.010 | 0.990 | 84824 | 421991 | 3692818 | 43.54 |
| 0.986 | 30-34 | 2.70 | 0.013 | 0.987 | 83938 | 416986 | 3270826 | 38.97 |
| 0.983 | 35-39 | 3.20 | 0.016 | 0.984 | 82812 | 410905 | 2853840 | 34.46 |
| 0.977 | 40-44 | 3.50 | 0.017 | 0.983 | 81498 | 404094 | 2442935 | 29.98 |
| 0.959 | 45-49 | 6.90 | 0.034 | 0.966 | 80084 | 393900 | 2038841 | 25.46 |
| 0.922 | 50-54 | 12.10 | 0.059 | 0.941 | 77368 | 375934 | 1644941 | 21.26 |
| 0.886 | 55-59 | 24.00 | 0.113 | 0.887 | 72824 | 344335 | 1269007 | 17.43 |
| 0.811 | 60-64 | 25.20 | 0.119 | 0.881 | 64580 | 304529 | 924671 | 14.32 |
| 0.723 | 65-69 | 57.20 | 0.250 | 0.750 | 56925 | 250441 | 620142 | 10.89 |
| 0.463 | 70-74 | 68.20 | 0.291 | 0.709 | 42681 | 183565 | 369701 | 8.66 |
| 0.330 | 75+ | 162.50 | 0.578 | 0.422 | 30247 | 186136 | 186136 | 6.15 |

## Egypt Rural Females 1986

k0 = 0.34630686
k1 = 1.32630291

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 103.9 | 0.099 | 0.901 | 100000 | 93544 | 6089448 | 60.89 |
| 1-4 | 9 | 0.035 | 0.965 | 90123 | 351971 | 5995904 | 66.53 |
| 5-9 | 1.6 | 0.008 | 0.992 | 86936 | 432775 | 5643933 | 64.92 |
| 10-14 | 0.9 | 0.004 | 0.996 | 86243 | 430287 | 5211158 | 60.42 |
| 15-19 | 1.1 | 0.005 | 0.995 | 85856 | 428150 | 4780871 | 55.68 |
| 20-24 | 1.3 | 0.006 | 0.994 | 85385 | 425598 | 4352721 | 50.98 |
| 25-29 | 1.6 | 0.008 | 0.992 | 84832 | 422538 | 3927122 | 46.29 |
| 30-34 | 1.8 | 0.009 | 0.991 | 84156 | 418971 | 3504585 | 41.64 |
| 35-39 | 2.3 | 0.011 | 0.989 | 83402 | 414721 | 3085614 | 37.00 |
| 40-44 | 2.1 | 0.010 | 0.990 | 82448 | 410175 | 2670893 | 32.39 |
| 45-49 | 4.1 | 0.020 | 0.980 | 81587 | 403963 | 2260718 | 27.71 |
| 50-54 | 7.3 | 0.036 | 0.964 | 79932 | 392782 | 1856755 | 23.23 |
| 55-59 | 14.8 | 0.071 | 0.929 | 77066 | 372133 | 1463974 | 19.00 |
| 60-64 | 15.8 | 0.076 | 0.924 | 71567 | 344781 | 1091840 | 15.26 |
| 65-69 | 45.9 | 0.206 | 0.794 | 66128 | 297966 | 747059 | 11.30 |
| 70-74 | 55 | 0.242 | 0.758 | 52514 | 232100 | 449093 | 8.55 |
| 75+ | 183.5 | 0.629 | 0.371 | 39818 | 216993 | 216993 | 5.45 |

**Tunisia Males 1985**

k0 = 0.22807
K1 = 1.41952

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 66.70 | 0.06 | 0.935 | 100000 | 95017 | 6638553 | 66.39 |
| 1-4 | 4.70 | 0.019 | 0.981 | 93545 | 369685 | 6543536 | 69.95 |
| 5-9 | 1.00 | 0.005 | 0.995 | 91803 | 457756 | 6173851 | 67.25 |
| 10-14 | 0.70 | 0.003 | 0.997 | 91345 | 455960 | 5716095 | 62.58 |
| 15-19 | 1.10 | 0.005 | 0.995 | 91026 | 453932 | 5260135 | 57.79 |
| 20-24 | 1.60 | 0.008 | 0.992 | 90527 | 450902 | 4806204 | 53.09 |
| 25-29 | 2.10 | 0.010 | 0.990 | 89805 | 446776 | 4355301 | 48.50 |
| 30-34 | 2.10 | 0.010 | 0.990 | 88867 | 442109 | 3908526 | 43.98 |
| 35-39 | 2.50 | 0.012 | 0.988 | 87939 | 437074 | 3466417 | 39.42 |
| 40-44 | 3.20 | 0.016 | 0.984 | 86847 | 430925 | 3029343 | 34.88 |
| 45-49 | 5.10 | 0.025 | 0.975 | 85468 | 422176 | 2598418 | 30.40 |
| 50-54 | 7.10 | 0.035 | 0.965 | 83316 | 409606 | 2176242 | 26.12 |
| 55-59 | 10.90 | 0.053 | 0.947 | 80410 | 391812 | 1766636 | 21.97 |
| 60-64 | 17.50 | 0.084 | 0.916 | 76144 | 365400 | 1374824 | 18.06 |
| 65-69 | 28.40 | 0.133 | 0.867 | 69761 | 326605 | 1009424 | 14.47 |
| 70-74 | 50.20 | 0.223 | 0.777 | 60511 | 270169 | 682820 | 11.28 |
| 75-79 | 99.40 | 0.398 | 0.602 | 47017 | 190164 | 412651 | 8.78 |
| 80+ | 127.20 | 0.483 | 0.517 | 28300 | 222487 | 222487 | 7.86 |

**Tunisia Females 1985**

k0 = 0.22278
K1 = 1.3933

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 59.30 | 0.06 | 0.942 | 100000 | 95524 | 6822149 | 68.22 |
| 1-4 | 4.70 | 0.019 | 0.981 | 94241 | 372388 | 6726625 | 71.38 |
| 5-9 | 1.00 | 0.005 | 0.995 | 92486 | 461159 | 6354237 | 68.71 |
| 10-14 | 0.60 | 0.003 | 0.997 | 92024 | 459460 | 5893078 | 64.04 |
| 15-19 | 0.80 | 0.004 | 0.996 | 91749 | 457864 | 5433618 | 59.22 |
| 20-24 | 1.20 | 0.006 | 0.994 | 91382 | 455600 | 4975755 | 54.45 |
| 25-29 | 1.50 | 0.007 | 0.993 | 90836 | 452549 | 4520155 | 49.76 |
| 30-34 | 2.10 | 0.010 | 0.990 | 90157 | 448525 | 4067605 | 45.12 |
| 35-39 | 2.30 | 0.011 | 0.989 | 89215 | 443628 | 3619081 | 40.57 |
| 40-44 | 2.70 | 0.013 | 0.987 | 88195 | 438137 | 3175453 | 36.00 |
| 45-49 | 3.80 | 0.019 | 0.981 | 87012 | 431132 | 2737315 | 31.46 |
| 50-54 | 5.30 | 0.026 | 0.974 | 85375 | 421515 | 2306183 | 27.01 |
| 55-59 | 8.00 | 0.039 | 0.961 | 83142 | 407885 | 1884668 | 22.67 |
| 60-64 | 14.20 | 0.069 | 0.931 | 79882 | 386262 | 1476783 | 18.49 |
| 65-69 | 25.60 | 0.120 | 0.880 | 74404 | 350540 | 1090521 | 14.66 |
| 70-74 | 48.20 | 0.215 | 0.785 | 65453 | 293480 | 739981 | 11.31 |
| 75-79 | 112.30 | 0.438 | 0.562 | 51376 | 202821 | 446501 | 8.69 |
| 80+ | 118.40 | 0.457 | 0.543 | 28852 | 243680 | 243680 | 8.45 |

**Morocco Males 1972**

k0 = 0.33
K1 = 1.24

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 142.70 | 0.13 | 0.867 | 100000 | 91076 | 5146704 | 51.47 |
| 1-4 | 22.90 | 0.088 | 0.912 | 86680 | 325767 | 5055628 | 58.32 |
| 5-9 | 2.70 | 0.013 | 0.987 | 79088 | 392524 | 4729861 | 59.80 |
| 10-14 | 2.00 | 0.010 | 0.990 | 78028 | 388275 | 4337336 | 55.59 |
| 15-19 | 3.20 | 0.016 | 0.984 | 77251 | 383313 | 3949062 | 51.12 |
| 20-24 | 3.50 | 0.017 | 0.983 | 76025 | 376960 | 3565748 | 46.90 |
| 25-29 | 3.80 | 0.019 | 0.981 | 74706 | 370156 | 3188789 | 42.68 |
| 30-34 | 4.10 | 0.020 | 0.980 | 73300 | 362931 | 2818632 | 38.45 |
| 35-39 | 4.90 | 0.024 | 0.976 | 71813 | 354892 | 2455702 | 34.20 |
| 40-44 | 6.80 | 0.033 | 0.967 | 70075 | 344750 | 2100810 | 29.98 |
| 45-49 | 10.00 | 0.049 | 0.951 | 67732 | 330730 | 1756060 | 25.93 |
| 50-54 | 15.10 | 0.073 | 0.927 | 64428 | 310890 | 1425330 | 22.12 |
| 55-59 | 20.70 | 0.098 | 0.902 | 59740 | 284593 | 1114441 | 18.65 |
| 60-64 | 29.90 | 0.139 | 0.861 | 53862 | 251326 | 829848 | 15.41 |
| 65-69 | 40.00 | 0.182 | 0.818 | 46369 | 211613 | 578521 | 12.48 |
| 70-74 | 63.10 | 0.273 | 0.727 | 37939 | 164880 | 366908 | 9.67 |
| 75-79 | 99.10 | 0.397 | 0.603 | 27600 | 111695 | 202029 | 7.32 |
| 80+ | 184.20 | 0.631 | 0.369 | 16640 | 90334 | 90334 | 5.43 |

**Morocco Females 1972**

k0 = 0.33
K1 = 1.24

| Age | Mx | qx | Px | lx | Lx | Tx | ex |
|---|---|---|---|---|---|---|---|
| <1 | 123.60 | 0.12 | 0.884 | 100000 | 92201 | 5267759 | 52.68 |
| 1-4 | 21.20 | 0.081 | 0.919 | 88359 | 333598 | 5175558 | 58.57 |
| 5-9 | 2.80 | 0.014 | 0.986 | 81171 | 402753 | 4841959 | 59.65 |
| 10-14 | 2.10 | 0.010 | 0.990 | 80043 | 398207 | 4439206 | 55.46 |
| 15-19 | 3.50 | 0.017 | 0.983 | 79207 | 392736 | 4040999 | 51.02 |
| 20-24 | 3.90 | 0.019 | 0.981 | 77833 | 385556 | 3648263 | 46.87 |
| 25-29 | 4.60 | 0.023 | 0.977 | 76330 | 377482 | 3262707 | 42.75 |
| 30-34 | 5.90 | 0.029 | 0.971 | 74594 | 367765 | 2885225 | 38.68 |
| 35-39 | 7.30 | 0.036 | 0.964 | 72425 | 355896 | 2517460 | 34.76 |
| 40-44 | 8.90 | 0.044 | 0.956 | 69829 | 341851 | 2161564 | 30.95 |
| 45-49 | 10.10 | 0.049 | 0.951 | 66789 | 326052 | 1819713 | 27.25 |
| 50-54 | 11.90 | 0.058 | 0.942 | 63500 | 308693 | 1493661 | 23.52 |
| 55-59 | 16.00 | 0.077 | 0.923 | 59831 | 288107 | 1184968 | 19.81 |
| 60-64 | 23.50 | 0.111 | 0.889 | 55228 | 261431 | 896861 | 16.24 |
| 65-69 | 36.60 | 0.168 | 0.832 | 49099 | 225739 | 635430 | 12.94 |
| 70-74 | 58.60 | 0.256 | 0.744 | 40867 | 179270 | 409691 | 10.02 |
| 75-79 | 93.50 | 0.379 | 0.621 | 30423 | 124448 | 230421 | 7.57 |
| 80+ | 178.30 | 0.617 | 0.383 | 18895 | 105973 | 105973 | 5.61 |

Source: UNECA (1992) Demographic Handbook for Africa

| Sudan Males 1993 | | | | k0= | 0.33 | | | | Sudan Females 1993 | | | | k0= | 0.33 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | k1= | 1.24 | | | | | | | | k1= | 1.24 | | |
| **Age** | **Mx** | **qx** | **Px** | **lx** | **Lx** | **Tx** | **ex** | | **Age** | **Mx** | **qx** | **Px** | **lx** | **Lx** | **Tx** | **ex** |
| <1 | 132.76 | 0.124 | 0.876 | 100000 | 91659 | 4989015 | 49.89 | | <1 | 110.52 | 0.105 | 0.895 | 100000 | 92983 | 5291448 | 52.91 |
| 1-4 | 15.15 | 0.059 | 0.941 | 87550 | 335989 | 4897356 | 55.94 | | 1-4 | 15.03 | 0.058 | 0.942 | 89527 | 343685 | 5198465 | 58.07 |
| 5-9 | 3.56 | 0.018 | 0.982 | 82401 | 408006 | 4561367 | 55.36 | | 5-9 | 3.60 | 0.018 | 0.982 | 84301 | 417372 | 4854779 | 57.59 |
| 10-14 | 2.60 | 0.013 | 0.987 | 80947 | 402226 | 4153361 | 51.31 | | 10-14 | 2.78 | 0.014 | 0.986 | 82798 | 411245 | 4437408 | 53.59 |
| 15-19 | 3.89 | 0.019 | 0.981 | 79902 | 395814 | 3751135 | 46.95 | | 15-19 | 3.96 | 0.020 | 0.980 | 81655 | 404431 | 4026163 | 49.31 |
| 20-24 | 5.54 | 0.027 | 0.973 | 78362 | 386674 | 3355321 | 42.82 | | 20-24 | 5.15 | 0.025 | 0.975 | 80054 | 395384 | 3621732 | 45.24 |
| 25-29 | 6.05 | 0.030 | 0.970 | 76221 | 375656 | 2968647 | 38.95 | | 25-29 | 5.87 | 0.029 | 0.971 | 78019 | 384677 | 3226348 | 41.35 |
| 30-34 | 6.93 | 0.034 | 0.966 | 73950 | 363706 | 2592991 | 35.06 | | 30-34 | 6.64 | 0.033 | 0.967 | 75762 | 372871 | 2841671 | 37.51 |
| 35-39 | 8.32 | 0.041 | 0.959 | 71431 | 350171 | 2229285 | 31.21 | | 35-39 | 7.48 | 0.037 | 0.963 | 73288 | 359980 | 2468800 | 33.69 |
| 40-44 | 10.47 | 0.051 | 0.949 | 68520 | 334213 | 1879115 | 27.42 | | 40-44 | 8.48 | 0.042 | 0.958 | 70597 | 345950 | 2108820 | 29.87 |
| 45-49 | 13.33 | 0.065 | 0.935 | 65025 | 315058 | 1544902 | 23.76 | | 45-49 | 10.03 | 0.049 | 0.951 | 67666 | 330384 | 1762870 | 26.05 |
| 50-54 | 18.17 | 0.087 | 0.913 | 60831 | 291466 | 1229844 | 20.22 | | 50-54 | 13.60 | 0.066 | 0.934 | 64355 | 311619 | 1432486 | 22.26 |
| 55-59 | 24.83 | 0.117 | 0.883 | 55544 | 262139 | 938377 | 16.89 | | 55-59 | 18.50 | 0.088 | 0.912 | 60123 | 287858 | 1120866 | 18.64 |
| 60-64 | 36.06 | 0.165 | 0.835 | 49052 | 225788 | 676238 | 13.79 | | 60-64 | 27.95 | 0.131 | 0.869 | 54808 | 256856 | 833008 | 15.20 |
| 65-69 | 52.07 | 0.230 | 0.770 | 40939 | 182061 | 450451 | 11.00 | | 65-69 | 41.41 | 0.188 | 0.812 | 47648 | 216786 | 576152 | 12.09 |
| 70-74 | 77.40 | 0.324 | 0.676 | 31508 | 133021 | 268390 | 8.52 | | 70-74 | 65.01 | 0.280 | 0.720 | 38708 | 167566 | 359366 | 9.28 |
| 75-79 | 116.79 | 0.452 | 0.548 | 21291 | 83361 | 135369 | 6.36 | | 75-79 | 101.00 | 0.403 | 0.597 | 27885 | 112443 | 191800 | 6.88 |
| 80+ | 224.35 | 0.719 | 0.281 | 11668 | 52008 | 52008 | 4.46 | | 80+ | 209.71 | 0.688 | 0.312 | 16642 | 79358 | 79358 | 4.77 |